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NATIONAL DAM INSPECTION PROGRAM. LITTLE YOUGHIOGHENY RIVER SITE--ETC(U)

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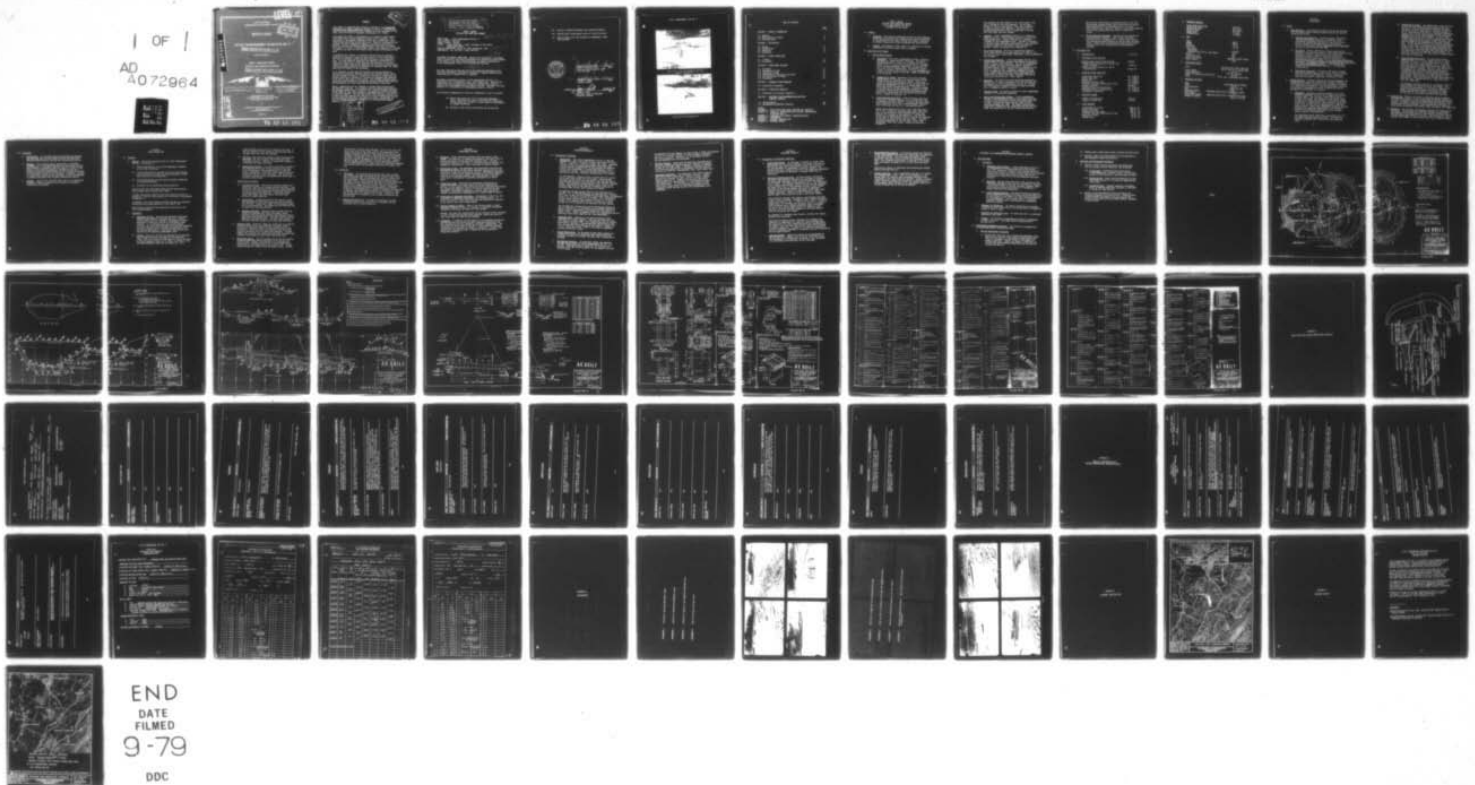
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LITTLE YOUGHIOGHENY RIVER SITE NO. 5

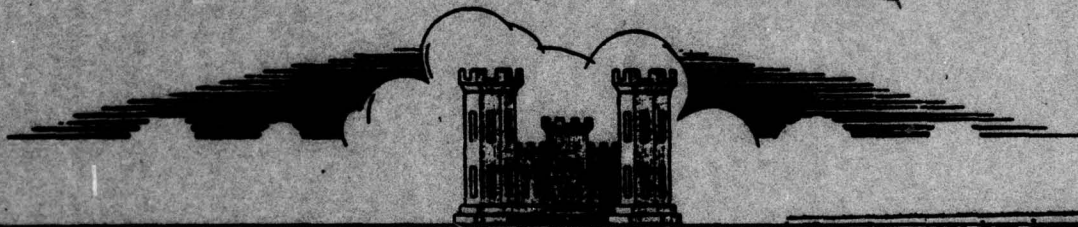
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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

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7902 BELAIR ROAD
BALTIMORE, MARYLAND 21236

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PREFACE

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This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase 1 investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase 1 investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase 1 inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

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National Dam Inspection Program. Little
Youghiogheny River Site Number 5
(NDI-ID-MD-55), Ohio River Basin,
Landon's Dam Run, Garrett County,
Maryland. Phase I Inspection Report.

PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM

10 James D. Hainley

NAME OF DAM: Little Youghiogheny Site No. 5

STATE LOCATED: Maryland

COUNTY LOCATED: Garrett

STREAM: Landon's Dam Run, a small tributary of the Little
Youghiogheny River

DATES OF INSPECTION: April 10, 1979, and May 24, 1979

COORDINATES: Lat. 39° 22.5', Long. 79° 22.5'

11 Jun 79

12 69p

ASSESSMENT OF GENERAL CONDITIONS: Based on the evaluation of available design information, and visual observations of conditions as they existed on the dates of the field reconnaissances, the general condition of Little Youghiogheny Site No. 5 is considered to be good.

15 DACW31-79-C-P438

Wet zones observed at the toe area of the downstream embankment slope should be periodically observed to determine if seepage conditions are developing and if remedial work is required.

According to guideline criteria, Little Youghiogheny Site No. 5 is classified as an "intermediate" size, "high" hazard dam. Based on Soil Conservation Service hydrological/hydraulic computations, spillway capacity was found adequate to pass 100% of the PMF. Therefore, spillway capacity is in accordance with recommended guideline criteria.

The following recommendations should be implemented as soon as possible:

- (1) Monitor wet zones near toe of downstream embankment slope. Monitoring to consist of periodically observing the wet zones for increases in areal extent or development of seepage conditions.
- (2) Develop a formal flood surveillance and warning plan.

- (3) Develop a formal maintenance and inspection program.
- (4) Replace small animal guard screen on outlet toe drain.
- (5) Repair eroded rills and footpaths on embankment slopes and junctions.

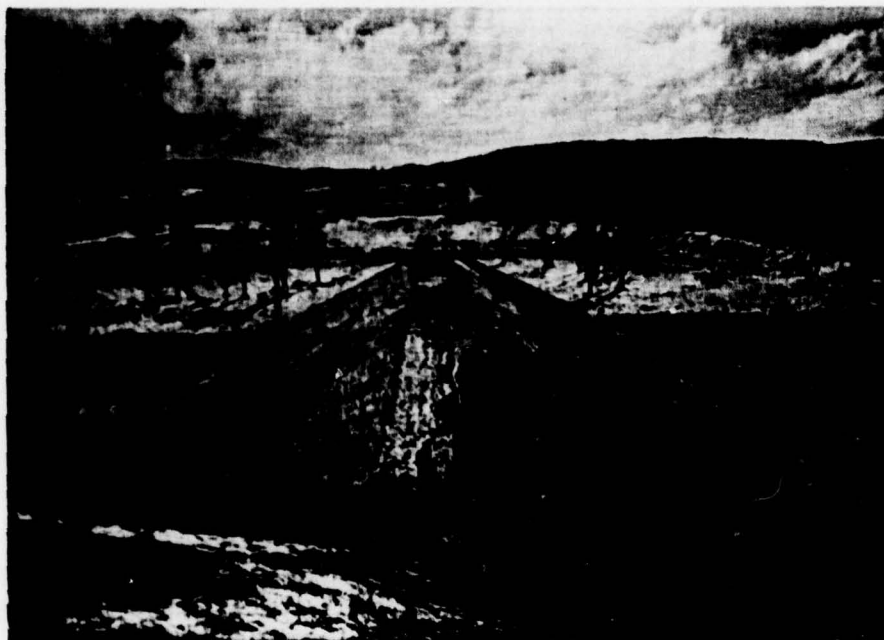


James D. Hainley 15 June '79
James D. Hainley, P.E. Date
Maryland Registration No. 5284
Vice President

Timothy E. Debes 15 June '79
Timothy E. Debes Date
Project Engineer

APPROVED BY: *James W. Peck* 16 July '79
JAMES W. PECK Date
Colonel, Corps of Engineers
District Engineer

LITTLE YOUGHIOGHENY SITE NO. 5



Overview of Dam and Emergency Spillway
Channel Looking East



Overview of Dam Looking West

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM
LITTLE YOUGHIOGHENY SITE NO. 5
NATIONAL I.D. NO. MD 55

1.1 General

- a. Authority. The study was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.
- b. Purpose. The purpose of this study is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances

- 1) Embankment. The Little Youghiogheny Site No. 5 dam was designed as a zoned earthfill structure. The dam is approximately 550 ft. long, has a maximum toe-to-crest height of 41 ft., and a crest width of 15 ft. Upstream and downstream embankment slopes have inclinations of 3H:1V and 2.5H:1V, respectively. An earthfill cutoff trench is located on the centerline of the embankment and extends the full length of the dam. (Refer to Plate Nos. 1, 2, 3, and 4.)
- 2) Seepage Drain System. According to as-built drawings, seepage water is collected by a sand and gravel filter trench and perforated pipe drain system. This drain system is located approximately 45 ft. upstream from the downstream embankment toe and is extended about 8 ft. below the original ground elevation. Collected seepage is drained out of the dam embankment by means of a sand and gravel blanket drain and two non-perforated outlet drain pipes located near the reinforced concrete pipe outlet. (Refer to Plate No. 3.)
- 3) Flood Discharge Facilities. Flood discharge facilities consist of a principal spillway riser, outlet pipe, and an emergency spillway channel. Principal spillway intake works include an 18 in. dia. corrugated metal reservoir drain inlet pipe and two 8 ft. long overflow weirs.

Outlet works consist of an 18 in. dia. slide gate and a 48 in. dia. reinforced concrete outlet pipe. The slide gate is controlled by a hand operated turn wheel and provides for drawdown of the reservoir. The concrete outlet pipe is approximately 230 ft. long and is connected to the base of the principal spillway riser. The pipe discharges downstream of the dam into a 30 ft. wide plunge pool lined with riprap. (Refer to Plate Nos. 1 through 5.)

The emergency spillway channel is cut into natural earth and is located on the right abutment. The spillway channel is 125 ft. wide, 600 ft. long, and is underlain by sand and gravel soil materials. Spillway flow is discharged approximately 150 ft. downstream of the dam into the plunge pool exit channel.

- b. Location. Little Youghiogheny Site No. 5 is located on Landon's Dam Run, a north flowing tributary of the Little Youghiogheny River. Landon's Dam Run is a secondary tributary of the Youghiogheny River. The dam is situated in Garrett County, Maryland, approximately 1 mile southeast of Mountain Lake Park and about 3 miles southeast of Oakland. (Refer to Location Plan, Appendix E.)
- c. Size Classification. Based on a maximum dam height of 41 ft. and a top of dam storage capacity of 1,500 ac. ft., the dam facility is accordingly classified in the "intermediate" size category.
- d. Hazard Classification. Little Youghiogheny Site No. 5 is located three (3) miles upstream from Oakland's population center of about 1,800 residents. The Little Youghiogheny River channel traverses the south-central section of downtown Oakland. Hence, loss of life is expected in the event of a dam failure. Substantial damage could also occur to commercial and residential properties located along Landon's Dam Run and the Little Youghiogheny River channels during high flood flows. Therefore, the dam is accordingly classified as a "high" hazard.
- e. Ownership. The Wilson Run Public Watershed Association, Oakland, MD, is legally responsible for the operation and maintenance of Little Youghiogheny Site No. 5. The dam was constructed by easement of private properties owned by E. O. Wonderly, and W. M. Callis.
- f. Purpose of Dam. The primary purpose of Little Youghiogheny Site No. 5 is flood water detention.
- g. Design and Construction History. Little Youghiogheny Site No. 5 was designed by the Soil Conservation Service, Engineering and Watershed Planning Unit, Upper Darby, PA, in 1966. Construction began June 20, 1966, and was completed November 28, 1966. The Phoenix Construction Corporation, Cumberland, MD, constructed the dam facility under the supervision of the Soil Conservation Service.

Major design modifications included deletion of the left dam abutment seepage blanket drain and deletion of dental grout treatments of rock foundation surfaces. These modifications were primarily a result of excavated foundation rock surfaces being relatively free of fissures and cracks.

- h. Normal Operating Procedure. The dam facility operates as an uncontrolled structure. Under normal conditions, reservoir pool is maintained at El. 2,423, the level of the uncontrolled overflow weirs of the principal spillway riser. Flood flows are discharged through the principal spillway riser or in combination with the emergency spillway.

1.3 Pertinent Data

- a. Drainage Area 3.4 sq. mi.
- b. Discharge at Dam Facility
- | | |
|--|------------|
| Maximum known flood at dam facility | Unknown |
| Ungated spillway capacity at design high water elevation | 1,785 cfs |
| Ungated spillway capacity at top of dam elevation | 13,500 cfs |
- c. Elevation (feet above MSL)
- | | |
|--|--------------|
| Constructed top of dam | El. 2,452.8 |
| Design high water | El. 2,445.2 |
| Normal Pool | El. 2,423.4 |
| Emergency spillway crest | El. 2,442.0 |
| Principal spillway overflow weir crest | El. 2,423.4 |
| Maximum tailwater | Unknown |
| Upstream invert of outlet pipe | El. 2,414.0 |
| Downstream invert of outlet pipe | El. 2,412.0 |
| Streambed at centerline | El. 2,412.0± |
- d. Reservoir Length
- | | |
|------------------------|----------|
| Length of maximum pool | 0.85 mi. |
| Length of normal pool | 0.45 mi. |
- e. Total Storage
- | | |
|--|---------------|
| Constructed top of dam | 1,500 ac. ft. |
| Design high water | 865 ac. ft. |
| Emergency spillway crest | 625 ac. ft. |
| Principal spillway overflow weir crest | 42 ac. ft. |
| Normal pool level | 42 ac. ft. |
| Sediment pool | 42 ac. ft. |

f. Reservoir Surface

Constructed top of dam	96 acres
Design high water	68.5 acres
Spillway crest	59 acres
Normal pool	11 acres
Sediment pool	11 acres

g. Dam

Type	Earth
Length	550 ft.
Height	41 ft.
Top width	15 ft.
Side slopes	
Downstream	2.5H:1V
Upstream (with 10 ft. wide bench)	3H:1V
Zoning	yes
Impervious core	yes
Cutoff provisions	Compacted cutoff trench
Grout curtain	none

h. Regulating Outlet

Type	Concrete drop inlet riser and 36 in. dia. R. C. outlet pipe
Riser height	9.5 ft.
Riser dimensions	3x9 ft. interior
Length of connecting outlet pipe	225 ft.
Gates	18 in. dia. slide gate Class 0-29

i. Emergency Spillway

Type	Trapezoidal earth channel
Width	125 ft.
Crest elevation	2,442.0 ft. MSL
Gate	None
Upstream channel	Vegetated earth with a negative 1% slope
Crest width	30 ft.
Downstream channel	Vegetated earth with a positive 2.8% slope
Length of channel	600 ft., curved

SECTION 2 DESIGN DATA

2.1 Design

- a. Data Available. The following available data can be obtained from the Maryland Water Resources Administration and the Soil Conservation Service.
- 1) Hydrology and Hydraulics. Available design information includes hydrological calculation summaries, flood hydrographs, discharge calculations, and rating curves. Design information obtained from Soil Conservation Service design report, Little Youghiogheny River Watershed, Site No. 5, dated February 28, 1966.
 - 2) Embankment. Design information includes construction drawings, slope stability summary, construction specifications, geologist's report, laboratory soil test data and a construction history report. Available information obtained from the report identified in Section 2.1-a(1) and Construction Specifications, Little Youghiogheny Watershed, Site No. 5, and Engineer's Report on Construction and Test Results for Little Youghiogheny Site No. 5. All reports were prepared by Soil Conservation Service, U. S. Department of Agriculture.
 - 3) Appurtenant Structures. Available information includes detailed structural design calculations, design drawings, and construction specifications. Design information obtained from reports identified in Section 2.1-a(2).
- b. Design Features. Principal features of the dam embankment and appurtenant structures are illustrated on Plates 1 through 5. A description of design features is also discussed in Section 1.2, "Description of Project". Dam and appurtenant structures are designed in accordance with Soil Conservation Service, structure classification "C" criteria.
- 1) Embankment. According to design documents, the zoned earthfill embankment consists of an impervious core and an outer shell. The core has a base width of 60 ft., 0.5H:1V side slopes, and extends from the cutoff trench to about 9 ft. below the dam crest. The central section of the core is constructed of clay earthfill, while the outer 10 ft. of the core is constructed of a sand and gravel mixture. Outer shell embankment earthfill consists primarily of clayey and sandy gravels. All earthfill materials were obtained from borrow sources located within reservoir site boundaries.

The underlying cutoff trench has a base width of 12 ft. and side slope inclinations of 1H:1V. The trench is extended to bedrock and is backfilled with compacted clay.

2) Seepage Drain System. The seepage drain system consists of a 12 in. dia. perforated pipe located in the top section of a filter trench drain, excavated to bedrock. The drain system is about 460 ft. long and includes a 25 ft. long extension installed to intercept intermittent seepage from a spring source located at the downstream embankment toe of the left abutment. An 18 ft. wide blanket drain and two 12 in. dia. corrugated outlet pipes collect seepage from the filter trenches and drain the water through the dam embankment to the outlet plunge pool. At the junction of the filter trenches and blanket drain, a clay plug is constructed directly beneath the blanket drain. This clay plug provides support for the concrete outlet pipe and cradle and blocks drainage from the lower half of the connecting filter trenches. As previously reported, the left dam abutment seepage blanket drain was not installed.

3) Flood Discharge Facilities. The concrete principal spillway riser is 12.5 ft. in height and has an inside dimension of 3x9 ft. A steel grate serves as a roof cover for the "drop inlet" spillway riser. Trash rack provisions consist of three angle iron crosspieces for each overflow weir opening. The 36 in. dia. outlet pipe is supported on a continuous concrete cradle and is constructed with seven (7) equally spaced reinforced concrete anti-seep collars. A reinforced concrete wall bent supports the pipe outlet at the location of the plunge pool. Water entering the spillway flows vertically down the riser, through the 230 ft. long outlet pipe, into the plunge pool.

The emergency spillway consists of a trapezoidal natural earth channel with 2H:1V and 3H:1V side slopes. The upstream spillway channel is inclined on a negative 1% slope, the downstream channel a positive 2.8% slope. Maximum channel flow velocity is estimated to reach 7.2 ft./sec. at the control section of the spillway.

2.2 Construction. Based on the review of available design documents and field observations, it may be concluded the dam was constructed in general accordance with the intended design drawings and specifications. No unusual construction difficulties were reported. Soil Conservation Service provided a field representative to supervise construction and perform field density tests to monitor fill compaction.

2.3 Operation. The principal and emergency spillways are uncontrolled structures. No performance or operation records are maintained. The mechanical slide gate housed in the principal spillway riser is the only operational feature of the dam. The slide gate is used to regulate the drawdown of the reservoir pool and is normally closed.

2.4 Evaluation

- a. Availability. All available design information and drawings were obtained from the Dam Safety Division, Maryland Water Resources Administration, and the Soil Conservation Service.
- b. Adequacy. The available design information is reasonably documented and is considered adequate to evaluate the dam and appurtenances in accordance with the scope of a Phase 1 study. However, slope stability summaries presented in the Soil Conservation Service design report, do not indicate the factors of safety against shear failure obtained. In general, the dam and appurtenant structures are considered to have been designed in general conformance with accepted engineering practice.
- c. Validity. Based on the available data, there is no observable evidence or reason to question the validity of the design information and drawings.

SECTION 3 VISUAL INSPECTION

3.1 Findings

- a. General. The on-site reconnaissance of Little Youghiogheny Site No. 5 consisted of:

- 1) Visual observations of the earth embankment, abutment, and spillway structures.
- 2) Visual observation of exposed sections of the concrete principal spillway riser, gate valve mechanisms, outlet pipe, reservoir, and plunge pool.
- 3) Visual observations of discernible hazardous conditions or safety deficiencies.
- 4) Evaluation of the downstream hazard potential.

Visual surveys were performed during periods when reservoir and tailwater were at normal pool levels.

A visual observation checklist and field sketch are given in Appendix A. Specific observations are illustrated in photographs of Appendix D.

In general, visual observations indicate the dam was adequately maintained and in good condition at the present time.

The following conditions were observed on the dates of the field reconnaissances.

- b. Embankment

- 1) Embankment Surface. Upstream and downstream embankment slope surfaces appeared saturated and soft. Several surface areas were also "pitted", and appeared slightly depressed in elevation relative to surrounding slope surfaces. It is presumed past and current grazing activities by cattle have loosened and pitted the embankment surface, allowing surface drainage to erode small rills and shallow depressions. A few animal burrow holes were observed on the downstream embankment slope.
- 2) Erosion. Minor rill erosion was observed on the upstream left abutment junction, and areas of the downstream slope. The rill erosion is attributed to surface drainage. An eroded footpath, about 0.1 ft. deep, is located on the upstream embankment slope near the shoreline. This

eroded footpath extends the full length of the dam. A shallow footpath is also eroded on the upstream edge of the dam crest, near the left abutment.

- 3) Wet Zone. Wet zones were observed along the downstream embankment toe area on each side of the outlet pipe discharge structure. However, no measurable seepage is associated with these wet zones.
- 4) Seepage Drain System. The outlet toe drains, located on the right and left sides of the concrete outlet pipe, were discharging at the estimated rate of 1 gpm and 5 gpm, respectively. The small animal guard screen was missing on the west outlet toe drain. The protective bituminous coating on the corrugated metal drain pipes is partially deteriorated.

c. Appurtenant Structures

- 1) Principal Spillway. There was no observed evidence of cracking or spalling on exposed concrete surfaces. Trash racks were observed free of debris and in good condition. The 18 in. dia. slide gate was exercised and found to be in adequate operating condition. Slide gate control stem, stem guides, and steel grate roof cover were observed in good condition.
- 2) Outlet Works. Exposed sections of the concrete outlet pipe and support cradle were observed free of cracking and spalling. Plunge pool riprap lining appeared stable and in good condition. The plunge pool was observed free of debris and flow obstructions.
- 3) Emergency Spillway. Spillway channel bottoms and side slopes are vegetated with grass and appear stable. Spillway inlet and outlet channels were observed free of debris and flow obstructions. Spillway channel surfaces appeared saturated and soft. The soil cover complex in this area consists primarily of clayey sand and gravel.

- d. Reservoir Area. Reservoir slopes and shorelines are primarily covered with grass and some woodland, and appear stable. Evidence of shoreline erosion or slope instability was not discernible. Reservoir water and discharge from the outlet pipe was relatively free of significant turbidity. Streams feeding the reservoir are stable and reportedly transport some sediment from neighboring cultivated farm properties.

- e. Downstream Channel. The left stream bank of the exit channel is being eroded immediately downstream of the plunge pool riprap lining. However, the erosion is not affecting the functioning of the plunge pool at the present time. Stream channel bottoms are cobble lined and appear stable. No flow

obstructions or debris were observed. A 6 in. dia. cast iron drain pipe exits on the right side of the plunge pool exit channel installed to drain springs originating from the right emergency channel side slope. According to design documents, the pipe is connected to a tile drain system. Discharge from the drain pipe was estimated at the rate of 8 gpm. Landon's Dam Run meanders approximately 1.2 miles before joining the Little Youghiogheny River. About seven (7) inhabited residences are located within the estimated flood plain of Landon's Dam Run.

3.2 Evaluation

- a. Embankment. The observed saturated and soft slope surfaces are located both above and below normal reservoir pool level. These saturated areas are believed the result of recent snow melt and freeze - thaw action loosening the surface soils. The identified wet zones located near the toe of the downstream embankment are not considered to represent a significant hazard since seepage was not evident. However, these zones should be observed periodically to determine if a seepage condition is developing and if remedial treatments are necessary. In general, the observed deficiencies are surficial in scope and do not affect the stability of the dam. Therefore, the dam embankment is considered to be in good condition at the present time.
- b. Appurtenant Structures. Principal and emergency spillway structures appear to be functioning as designed, and are considered to be in good condition.

SECTION 4 OPERATIONAL FEATURES

- 4.1 Procedure. Normal operating procedure does not require a dam tender. The reservoir is normally maintained at the crest level of the overflow weirs of the principal spillway riser. The only operational feature of the dam is a slide gate used to regulate the drawdown of the reservoir. This slide gate is normally closed.
- 4.2 Maintenance of Dam. Dam embankment and appurtenant structures are maintained by the Wilson Run Public Watershed Association with the assistance of the Soil Conservation Service. Maintenance reportedly consists of cutting grass, repairing eroded gullies and footpaths, removing trash from dam premises, and clearing debris from the trash racks. Maintenance is generally performed on an annual basis.
- 4.3 Inspection of Dam. Operation and maintenance inspections are usually performed on an annual basis by the Soil Conservation Service, at the request of the Wilson Run Public Watershed Association. The inspections generally consist of visually examining the dam embankment, appurtenant structures, reservoir area, and outlet channel, and providing recommendations for needed remedial repairs.
- 4.4 Maintenance of Operating Facilities. Maintenance of the 18 in. dia. slide gate is reportedly conducted on an infrequent basis. As noted in Section 3.1-c(1), the slide gate was successfully operated on the date of the field reconnaissance.
- 4.5 Warning Systems in Effect. There is no warning system or formal emergency procedure to alert or evacuate, as necessary, downstream residents in the event or threat of a dam failure.

However, the local Soil Conservation Service district office indicated it will initiate appropriate safety measures, should the threat of high flood flows or a dam failure develop.

- 4.6 Evaluation. In general, the dam appears to be reasonably maintained and monitored by the Wilson Run Public Watershed Association and Soil Conservation Service inspection personnel, respectively. The identified wet zones noted in Section 3.1-b(3) should be observed periodically to determine any change in condition. A formal flood surveillance and warning plan is needed for the protection of downstream residents.

SECTION 5 HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

- a. Design Data. The Little Youghiogheny Site No. 5 reservoir watershed is about 2,150 acres in area, and ranges in relief from El. 3,140 to El. 2,424.5 at normal pool level. According to a map review and visual observations, watershed cover complex consists predominately of open pasture and woodland. A small pond impoundment is located approximately 1 mile upstream of the dam. Hydrology analyses were based on Soil Conservation Service, structure classification "C" criteria.

The dam impounds a reservoir with a surface area of 11 acres and a normal pool volume of 42 acre feet. The principal spillway overflow weirs pass the normal base flow and have a peak designed discharge corresponding to the 100-year frequency storm. The emergency spillway control crest is set at the maximum stage level of the 100-year frequency storm and is activated when surface runoff exceeds 4.3 inches.

The required spillway design flood for this dam facility is the PMF. Top of dam and emergency spillway hydraulic capacity were sized to pass the SCS freeboard hydrograph flood, corresponding to 26.2 in. of direct rainfall in 6 hours. Soil Conservation Service flood routing data indicates the 26.2 in. of direct rainfall will produce a peak inflow of 19,158 cfs of which 13,506 cfs will be passed by the emergency spillway channel.

The reviewed Soil Conservation Service hydrological/hydraulic design information is in accordance with accepted engineering practice and is considered to be adequate for the scope of a Phase 1 study. (Refer to Appendix C for Soil Conservation Service hydrology calculation summaries and flood hydrographs.)

- b. Experience Data. Records are not kept of reservoir level elevations or rainfall amounts. The storm of record for this area occurred in March 1936. Soil Conservation Service routing calculations indicate if the dam had been constructed at that time, the maximum flood stage would have been El. 2,440.6, or 11.4 ft. below top of dam. There is no record of emergency spillway activation to date.
- c. Visual Observations. On the dates of the visual surveys, no evidence was observed of conditions that would prevent the emergency spillway or principal spillway riser to function as designed.
- d. Overtopping Potential. As previously stated, the required spillway design flood for Little Youghiogheny Site No. 5 is the PMF. Hydrometeorological Report No. 33 indicates the adjusted 6 hour PMF direct rainfall for the subject site area is 21.5 inches.

The emergency spillway channel is sized to pass a flood corresponding to 26.2 in. of direct rainfall in 6 hours without overtopping the crest of the dam. Therefore, it is considered unlikely the dam embankment will be overtopped.

- e. Spillway Adequacy. Based upon the previously developed data, reservoir storage and spillway hydraulic capacity is adequate to pass the full PMF (100%). Therefore, the dam and spillway facilities are adequate and in accordance with the required criteria set forth for "intermediate" size, "high" hazard dams.
- f. Downstream Conditions. The plunge pool exit channel empties into the original stream bed of Landon's Dam Run. Landon's Dam Run has a gradient of about 0.5% and a natural channel width of about 10 ft. Landon's Dam Run joins the Little Youghiogheny River approximately 1.2 miles downstream near Loch Lynn Heights. In the event of a dam failure or high flood flows, about seven (7) inhabited residences will be inundated between the dam and the Little Youghiogheny River confluence.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

- a. Visual Observations. As indicated in Section 3, visual field observations did not reveal evidence of structural distress or deficiencies that would significantly affect the stability of the dam embankment or appurtenant structures. However, the observed wet zones located at the toe of the downstream embankment should be monitored to determine if seepage conditions are developing.
- b. Design and Construction Data. Available design information indicates slope stability analyses were performed on upstream and downstream embankment slopes using the modified Swedish Circle method. The analyses considered a 40 ft. high embankment with a steady-state phreatic surface sloping from the emergency spillway crest level to the proposed toe drain filter trench. According to the design summary, the as-built embankment slopes of 3H:1V and 2.5H:1V are reportedly stable under these assumed conditions. However, critical factors of safety against shear failure were not given in the design summary.

Slope stability analyses were based on consolidated undrained triaxial shear strengths. Laboratory shear strength parameters ranged from about $\phi = 23^\circ$, $c = 600$ psf to $\phi = 30^\circ$, $c = 1,100$ psf respectively, for remolded core and outer shell soil samples. These saturated shear strength parameters appear reasonable for the silty clay and clayey gravel soil materials they represent, with the possible exception of the high cohesion value of the gravel soil sample.

No documents or references were found to indicate that seepage analyses were performed.

Construction progress reports indicated the placement and compaction of embankment fill materials were performed under the supervision of a Soil Conservation Service representative. The reports also indicated field density tests were performed to monitor compaction. In general, all contract construction work was reportedly completed in accordance with Soil Conservation Service specifications.

- c. Operating Records. Operating records are not maintained at the dam facility. However, the structural stability of the dam embankments and appurtenant structures is not considered to be affected by the operation of the slide gate.

- d. Post-Construction Changes. A tile drain system was installed in the right emergency spillway side slope after the completion of the dam facility. The tile drain and blanket filter system was installed to drain springs that developed in this area. The collected spring water is diverted to the plunge pool exit channel by means of a 6 in. dia. cast iron drain pipe.

There are no reports of additional post-construction changes made at this dam facility.

- e. Seismic Stability. Little Youghiogheny Site No. 5 is located in a Seismic Zone 1 area. There is no information in the design report to indicate that earthquake conditions were considered in the slope stability analyses. However, assuming static stability analyses were based on a minimum factor of safety against shear failure of 1.5, the seismic stability of the dam structure may be considered adequate.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation

- 1) Embankment and Spillways. Little Youghiogheny Site No. 5 is considered to be in good condition at the present time. This conclusion is based on the reported excellent performance history of the dam, and the absence of discernible distress that would significantly affect the overall performance or stability of the dam embankment and appurtenances.
- 2) Wet Zones. The wet zones observed at the toe area of the downstream embankment slope are not considered to represent a significant hazard to the dam structure. However, these zones should be observed periodically to determine if seepage conditions are developing.
- 3) Flood Discharge Capacity. Reviewed hydrological/hydraulic design computations indicate spillway and storage capacities are sufficient to pass 100% of the PMF without overtopping the dam embankment. The spillway system is therefore considered adequate and in accordance with recommended guideline criteria.

- b. Adequacy of Information. The design information and drawings available for this review were of sufficient detail to adequately conduct a Phase 1 study.
- c. Necessity for Additional Data. No additional data is considered required at this time.
- d. Urgency. The following recommendations should be implemented as soon as possible. Wet zones should be monitored on a periodic basis.

7.2 Recommendations/Remedial Measures. The following recommendations are presented based on the data obtained:

a. Dam and Appurtenant Structures

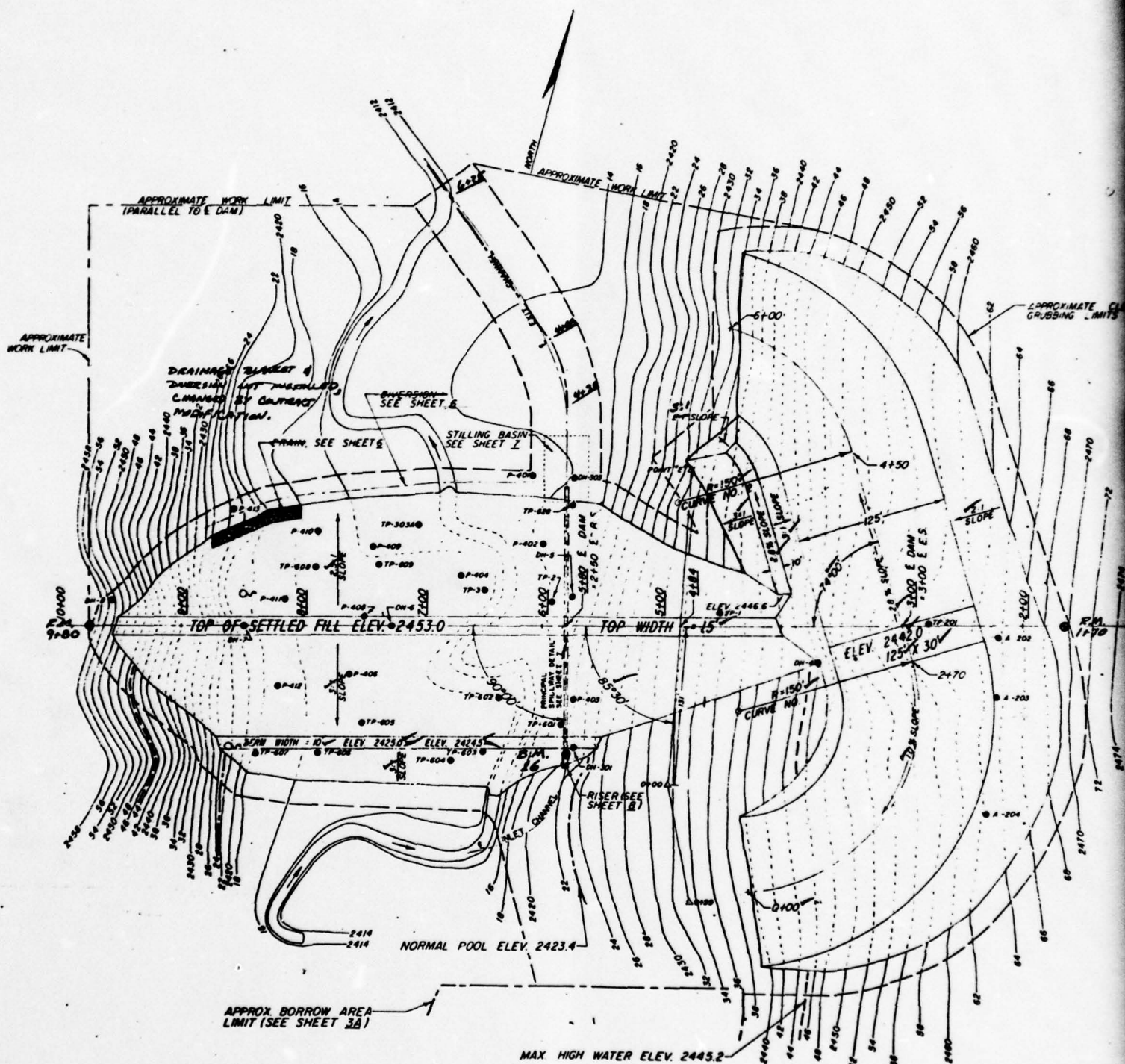
- 1) Monitor wet zones near toe of downstream embankment slope. Monitoring to consist of periodically observing the wet zones for increases in areal extent or development of seepage conditions. Report any change in conditions to the Maryland Water Resources Administration and the Soil Conservation Service.

- 2) Replace small animal guard screen on outlet toe drain pipe.
- 3) Backfill, tamp, and resod eroded rills and footpaths on dam embankment slopes and junctions.

b. Operation and Maintenance Procedures

- 1) Develop a formal flood surveillance and warning plan. Plan to include, but not limited to, the following:
 - (a) Surveillance. Around-the-clock surveillance of dam embankments, reservoir levels, and spillway channels during periods of unusually heavy rainfall.
 - (b) Warning System. Formal warning procedures to alert downstream residents in the event of expected high flood flows.
 - (c) Evacuation Plans. Adequate emergency contingency plans to evacuate downstream residents in the event or threat of a dam failure.
- 2) Develop a more thorough and active maintenance and inspection program at the dam facility. Program should include frequent maintenance and exercising of the reservoir drain gate valve and prompt remedial treatment of deficiencies.

PLATES



DATA FOR CURVE NO. 1

STATION	DEFLECTION ANGLE	CHORD DISTANCE
2+70	0°00'	0.00'
2+50	3°49'	19.99'
2+00	13°22'	49.77'
1+50	23°55'	49.77'
1+00	32°28'	49.77'
0+50	42°00'	49.77'
0+00	51°34'	49.77'

DATA FOR CURVE NO. 2

STATION	DEFLECTION ANGLE	CHORD DISTANCE
4+50	0°00'	0.00'
5+00	9°33'	49.77'
5+50	19°06'	49.77'
6+00	28°39'	49.77'

LEGEND

CONTOUR LINES	2400
TRAVERSE LINE	02+00
AUGER HOLE	• A-200
DRILL HOLE	• DM-1
PROBE HOLE	• P-400
TEST PIT	• TP-1
SPRING OR SEEP AREA	ON

CONSTRUCTION DETAILS

1. Topsoil salvaged shall be placed on the emergency spillway floor and slopes to a depth of 4 to 6 inches as directed by the Engineer.
2. For Description of logs see sheets 11 & 12.
3. The approximate Work Limit coincides with the approximate Clearing & Grubbing Limit except where indicated.

R.M. = REFERENCE MARKER

E DAM

R.M. 1+70 IS A BRASS MARKER SET IN CONCRETE, FLUSH WITH GROUND SURFACE, AT & DAM STA. 1+70. ELEV. 2468.95.

R.M. 9+00 IS A BRASS MARKER SET IN CONCRETE, FLUSH WITH GROUND SURFACE, AT & DAM STA. 9+00. ELEV. 2462.56

R.M. 16 IS A BRASS MARKER SET IN CENTER OF NORTH WING WALL OF RIVER. ELEV. 2426.62

AS BUILT

SCALE IN FEET



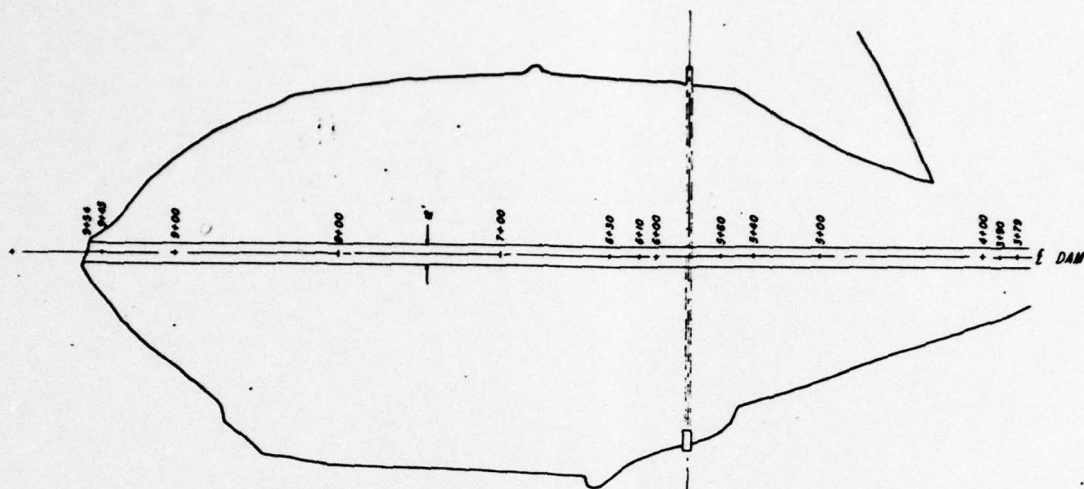
DAM SITE - CURVE DATA
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 5

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by	COLTON A. DE BRUIN	Date	
Drawn by	AS BUILT DRAWINGS	Approved by	
Traced by	M. A. KOSLOWSKI	Checked by	
Checked by		Drawn by	

PLATE NO. 1

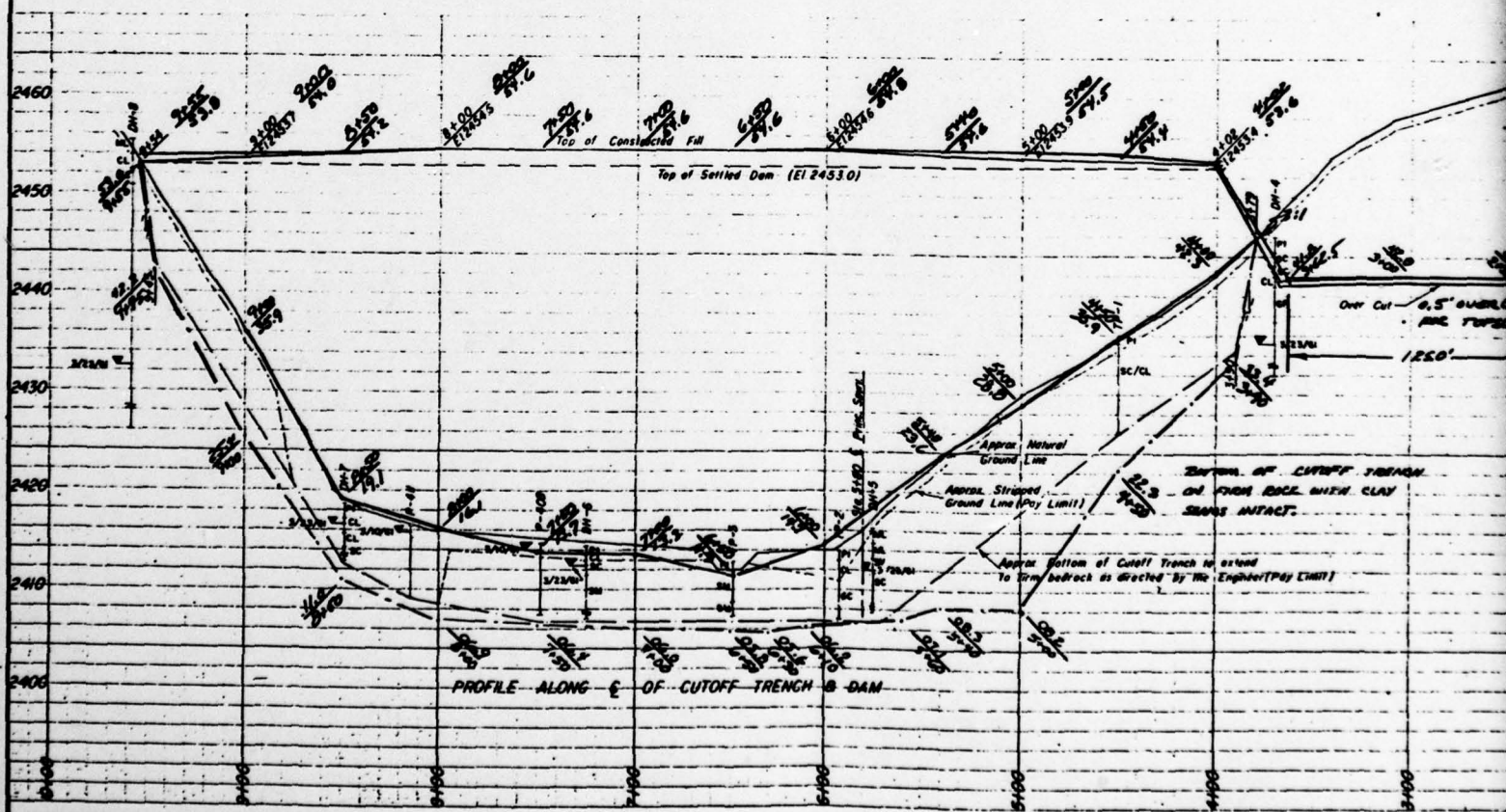
2



PLAN VIEW OF CUTOFF TRENCH

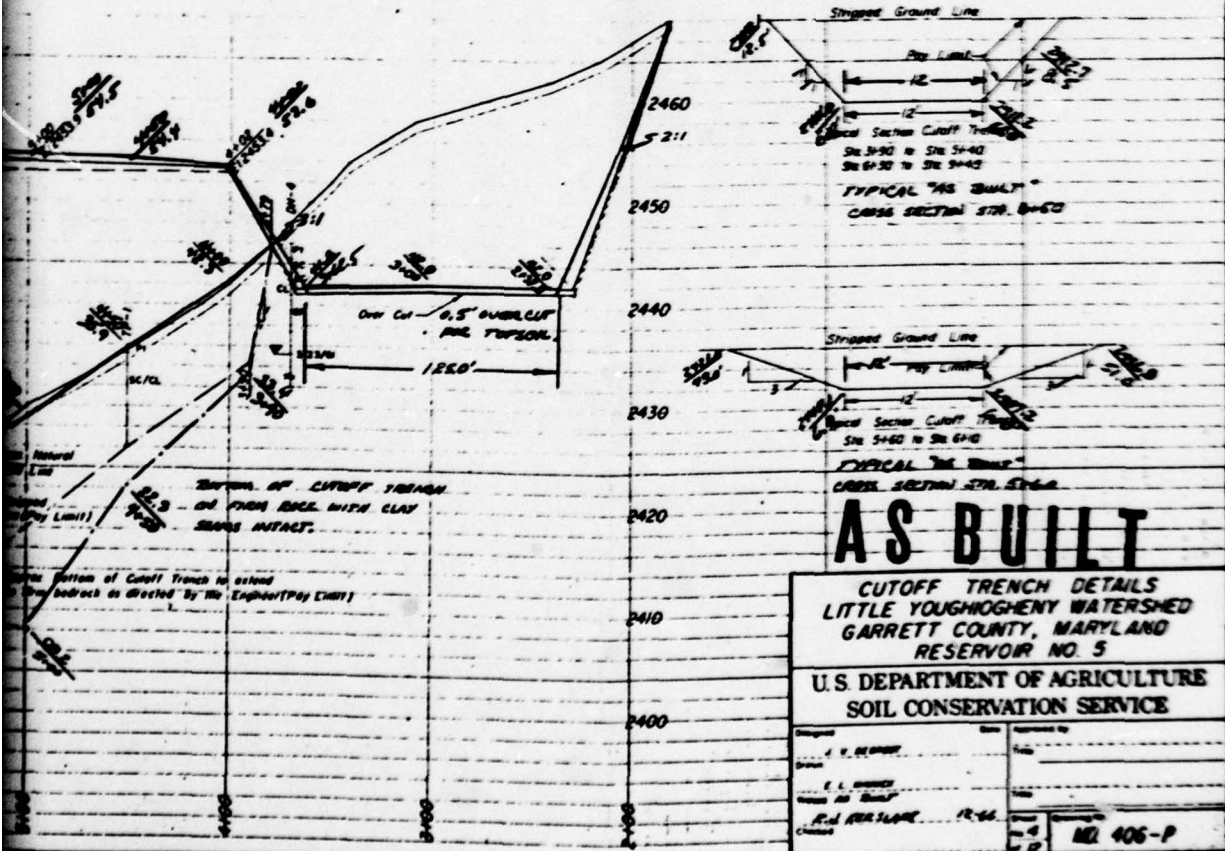
CONSTRUCTION

- ✓ 1. Cutoff trench shown
- ✓ 2. Commencement of trench
- ✓ 3. No bearing 1:1 in 1
- ✓ 4. Backfilling Engineer
5. For dam



CONSTRUCTION DETAILS

- ✓ 1. Cutoff trench backfill shall consist of the material designated for Zone I, as shown on sheet 5.
- ✓ 2. Common Excavation pay limits will be as follows:
 - a) Upper limit equals actual stripped ground line.
 - b) The lateral and lower limit equals the neat lines and grades as shown on the drawings or as designated by the Engineer.
- ✓ 3. No backfill done in required excavations will be placed on slopes greater than 1:1 in steepness.
- ✓ 4. Backfill shall be placed in the cutoff trench only in the presence of the Engineer.
5. For description of logs see sheets 11 & 12.

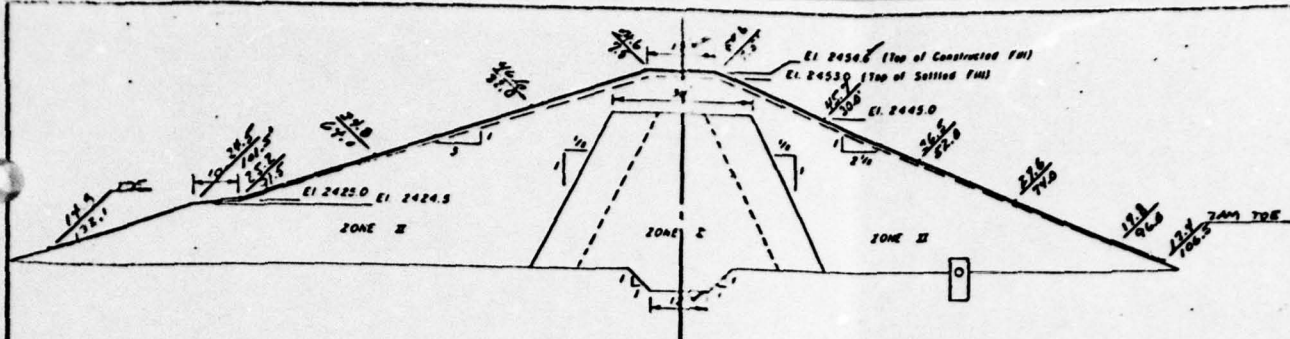


AS BUILT

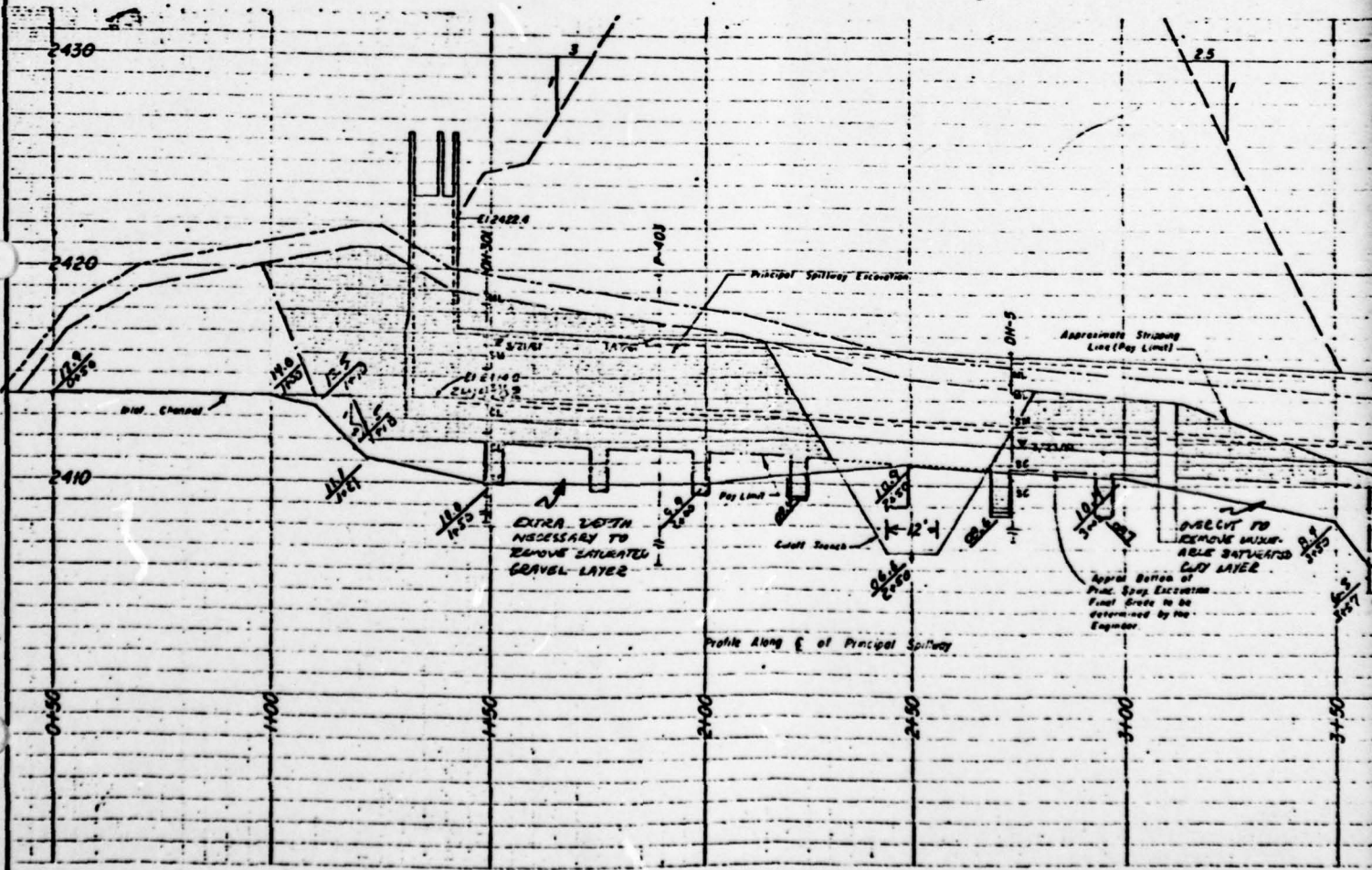
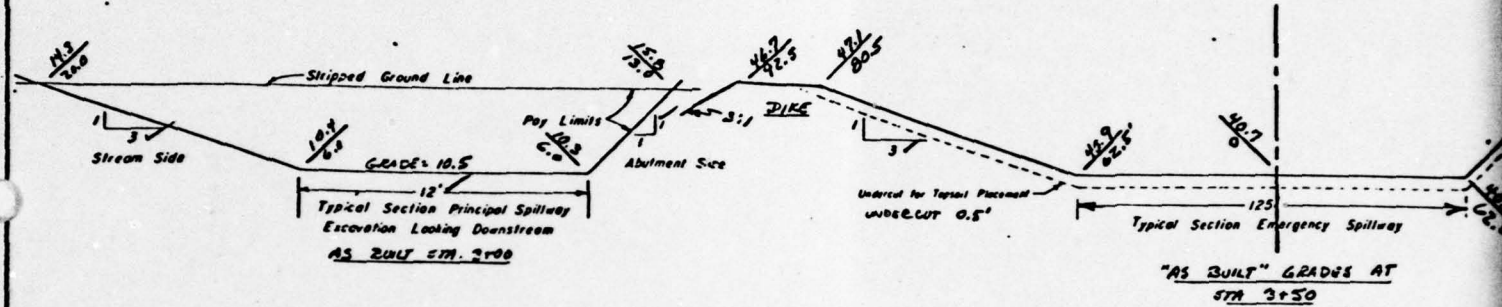
CUTOFF TRENCH DETAILS
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 5

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by J. V. BEHREND	Drawn by E. L. HENNING	Checked by R. L. HENNING	Date 12-64
Project No. MDL 406-P			Sheet No. 2



TYPICAL SECTION OF DAM AT STA. 6+50



CONSTRUCTION DETAILS

Earth Fill

Zone I approximately 26,400 C. Y.

(A) This zone shall consist of material obtained from borrow areas 1 and 2.

1. (C) material as represented by TP-619 (0.4'-1.9')
TP-626 (1.0'-2.0')
TP-616 (0.8'-3.0')
2. (C) material as represented by TP-618 (1.0'-3.6')
TP-625 (1.0'-3.5')

(B) The outside 10 feet of zone I shall consist of material from borrow areas 1 and 2 and the emergency spillway excavation selectively mined and placed as a transition section as directed by the Engineer.

1. (M) material as represented by TP-623 (0.3'-7.0')
2. (C) material as represented by TP-201 (2.5'-10.5')

(C) Compaction will be Class A. The fill matrix shall be compacted to no less than 95 percent of the maximum density obtained in compaction tests of the fill materials performed in accordance with Method C, ASTM Designation D-698.

(D) The moisture content of the fill matrix shall be no more than 1 percent above or 2 percent below optimum moisture content.

(E) The maximum size of rock fragments that shall be incorporated in the fill is 6 inches.

(F) The thickness of the layers of material before compaction shall not be more than 9 inches.

(G) The material obtained from foundation excavations shall be selectively placed in zone I as directed by the Engineer.

Zone II approximately 35,400 C. Y.

(A) This zone shall consist of (C) material obtained from the emergency spillway excavation as represented by TP-201 (2.5'-10.5') and (C) material obtained from borrow area No. 1 as represented by TP-619 (1.9'-4.8').

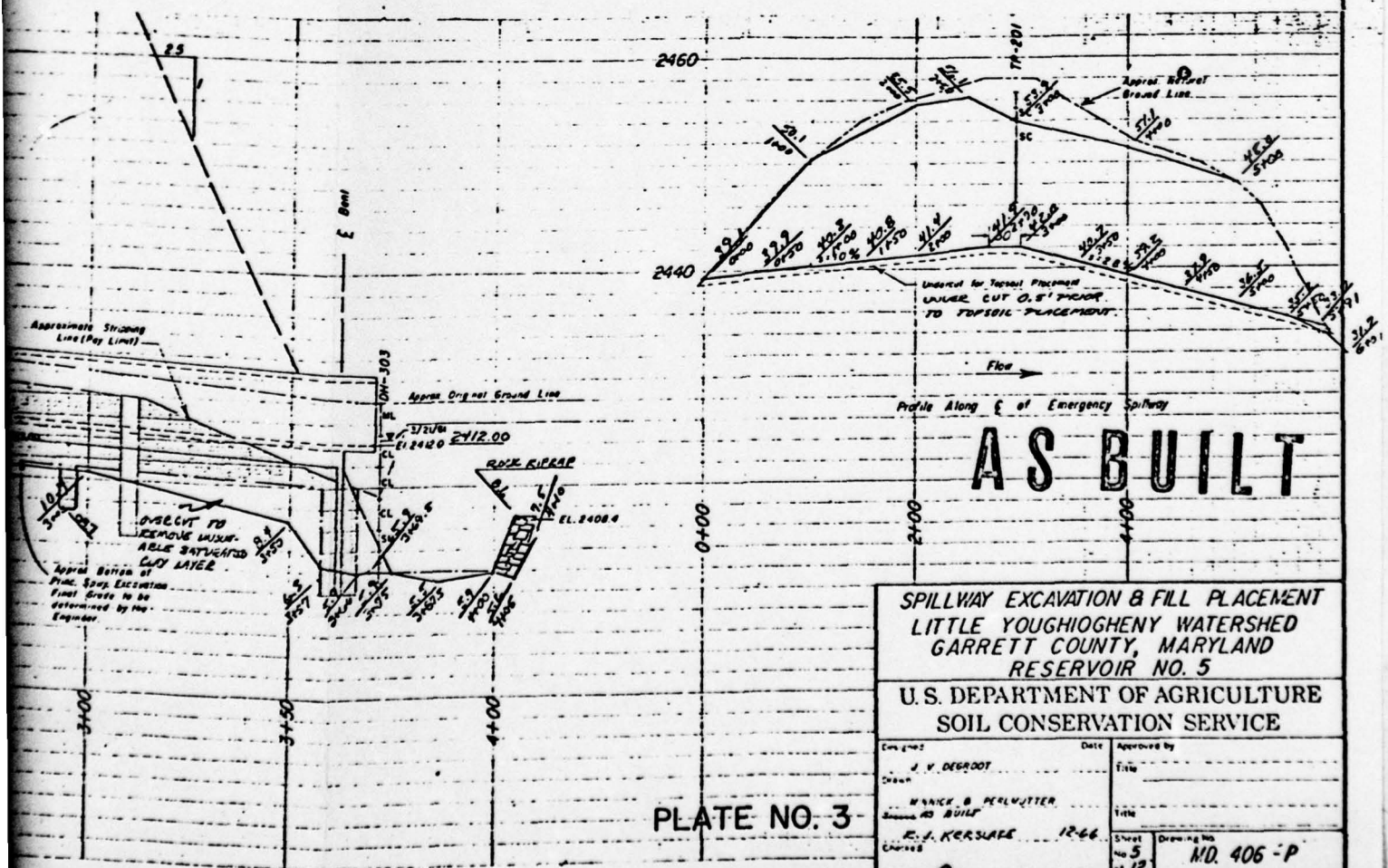
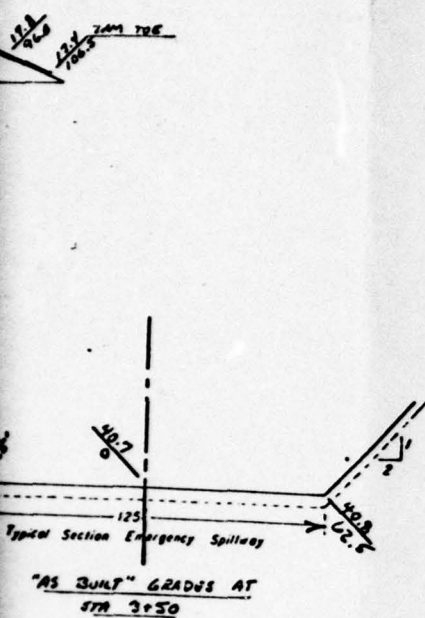
(B) Compaction will be Class A. The fill matrix shall be compacted to no less than 95 percent of the maximum density obtained in compaction tests of the fill materials performed in accordance with Method C, ASTM Designation D-698.

(C) The moisture content of the fill matrix shall be no more than 2 percent above or 1 percent below optimum moisture content.

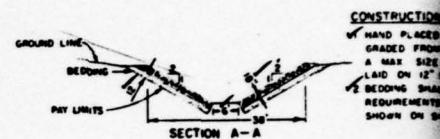
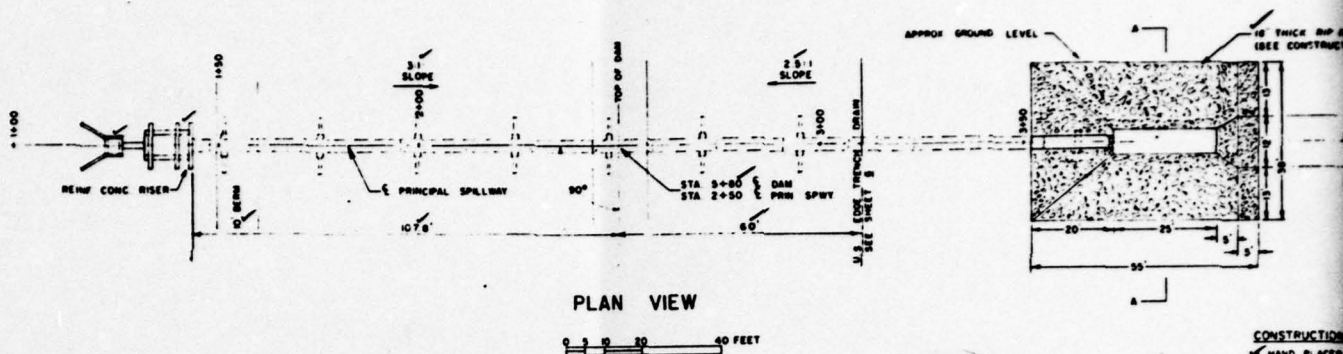
(D) The maximum size of rock fragments that shall be incorporated in the fill is 6 inches.

(E) The thickness of the layers of material before compaction shall not be more than 9 inches.

NOTE: For the description of the logs of the test holes see sheets 11 and 12.



INLET CHANNEL DATA
 BOTTOM WIDTH 10'
 SIDE SLOPE 1:1
 APPROX LENGTH 120'



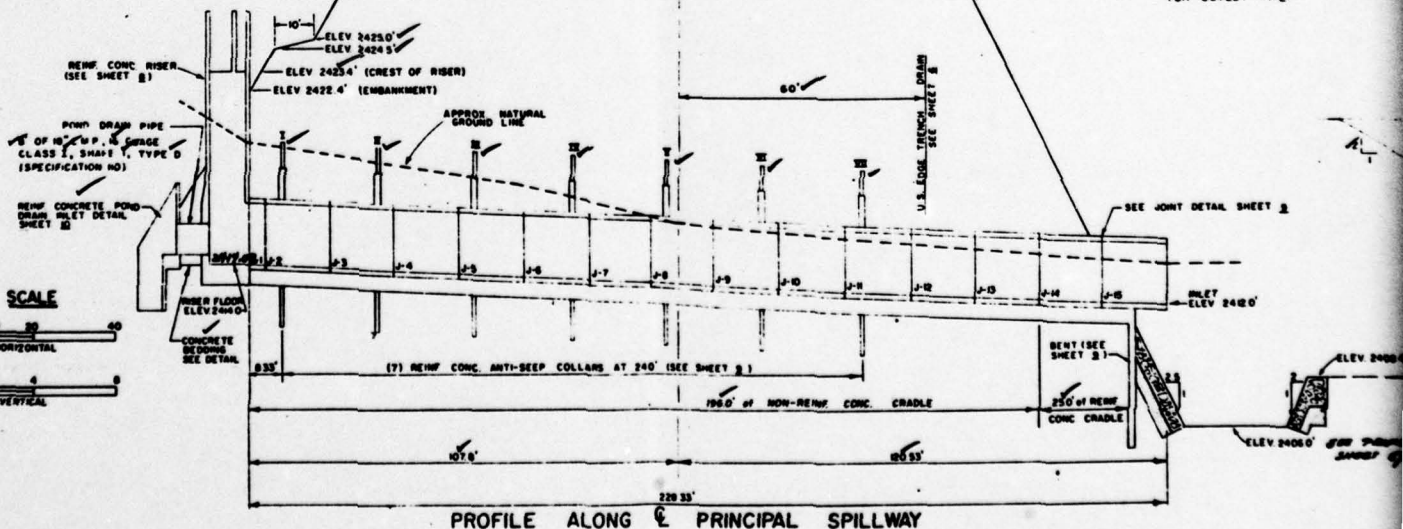
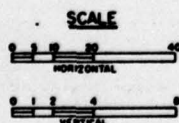
CONCRETE BEDDING

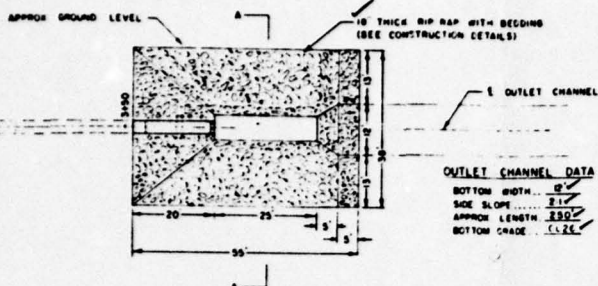


PRINCIPAL SPILLWAY CONDUIT

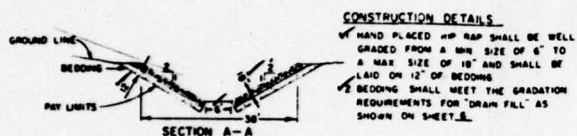
36" I.D. REINFORCED CONCRETE WALL
 (1) 16'-0" SECTIONS
 (1) 4'-0" SECTION
 (1) WALL PIECE FOR 12" WALL (ON
 TOTAL LENGTH 228.0' *INSTRUMENT*
 PRESSURE HEAD = 33'
 LOAD = 33,202 LBS PER LIN FOOT
 O.D. OF 352"
 MINIMUM 3 EDGE BEARING STRENGTH
 CRACK (PRESTRESSED PIPE, 16"
 6,742 LBS PER LIN FT
 MINIMUM 3 EDGE BEARING STRENGTH
 CRACK (NON-PRESTRESSED
 8,967 LBS PER LIN FT

PIPE SUPPLIERS NOTE
 LAST OUTSIDE OF SPIGOT JOINT IN
 CONCRETE ON ONE (1) 16' SECTION
 FOR OUTLET PIPE





OUTLET CHANNEL DATA
 BOTTOM WIDTH 10'
 SIDE SLOPE 2:1
 APPROX LENGTH 1302'
 BOTTOM GRADE 1.12%



JOINT	DISTANCE FROM RISER WALL	INVERT ELEV OF 36\" DIA PIPE	SLOPE	CONSTRUCTED ELEVATIONS
J-1	0 33	2414 00		14.02
J-2	4 33	2413 96		13.98
J-3	20 33	2413 83		13.83
J-4	36 33	2413 70		13.72
J-5	52 33	2413 57		13.57
J-6	68 33	2413 43		13.43
J-7	84 33	2413 30		13.32
J-8	100 33	2413 17		13.19
J-9	116 33	2413 02		13.02
J-10	132 33	2412 88		12.88
J-11	148 33	2412 73		12.72
J-12	164 33	2412 59		12.61
J-13	180 33	2412 44		12.44
J-14	196 33	2412 29		12.29
J-15	212 33	2412 15		12.15
OUTLET	228 33	2412 00		12.00

NOTE: DIMENSIONS FOR LENGTH OF PIPE ARE BASED ON NOMINAL LENGTHS AND DO NOT INCLUDE CREEP

COLLAR	DISTANCE FROM RISER WALL	INVERT ELEV OF 36\" DIA PIPE	P.S. STA.
I	8 33	2413 93	1+50.53
II	32 33	2413 73	1+74.53
III	56 33	2413 53	1+98.53
IV	80 33	2413 34	2+22.53
V	104 33	2413 13	2+46.53
VI	128 33	2412 91	2+70.53
VII	152 33	2412 69	2+94.53

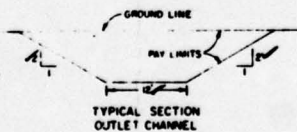
PRINCIPAL SPILLWAY CONDUIT (SPEC. 109)

36\" I.D. REINFORCED CONCRETE WATER PIPE

- (1) 16'-0\" SECTIONS
- (1) 4'-0\" SECTION
- (1) WALL PIECE FOR 12\" WALL (DETAIL SHEET 2)
- TOTAL LENGTH 228.0' DISTANCE 1800' ELEV. 7'
- PRESSURE HEAD = 33'
- LOAD = 33,203 LBS PER LIN FOOT BASED ON O.D. OF 35.2'
- MINIMUM 3 EDGE BEARING STRENGTH FOR 001\" CRACK (PRESTRESSED PIPE, AWWA-C-301) EQUALS 6742 LBS PER LIN FT
- MINIMUM 3 EDGE BEARING STRENGTH FOR 001\" CRACK (NON-PRESTRESSED PIPE, AWWA-C-300) EQUALS 8967 LBS PER LIN FT

PIPE SUPPLIERS NOTE

- LAST OUTSIDE OF SPIGOT JOINT RING WITH CONCRETE ON ONE (1) 16\" SECTION OF PIPE, FOR OUTLET PIPE



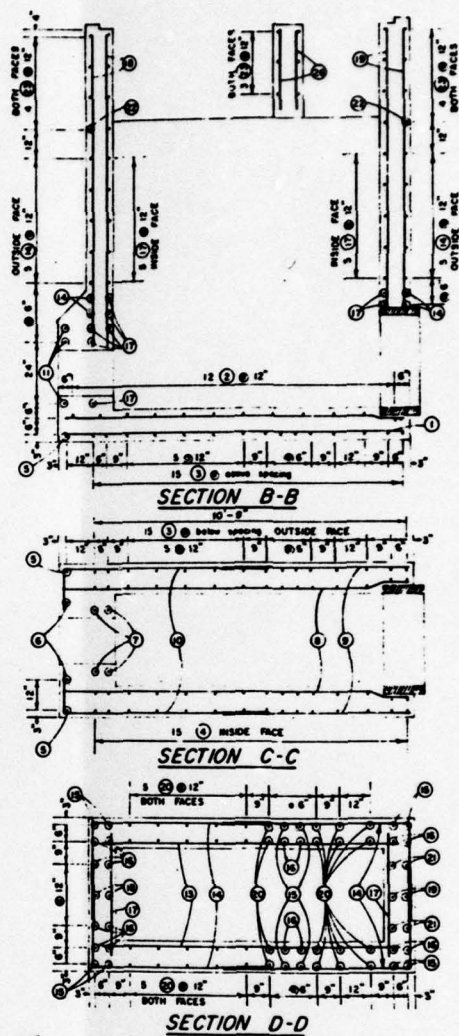
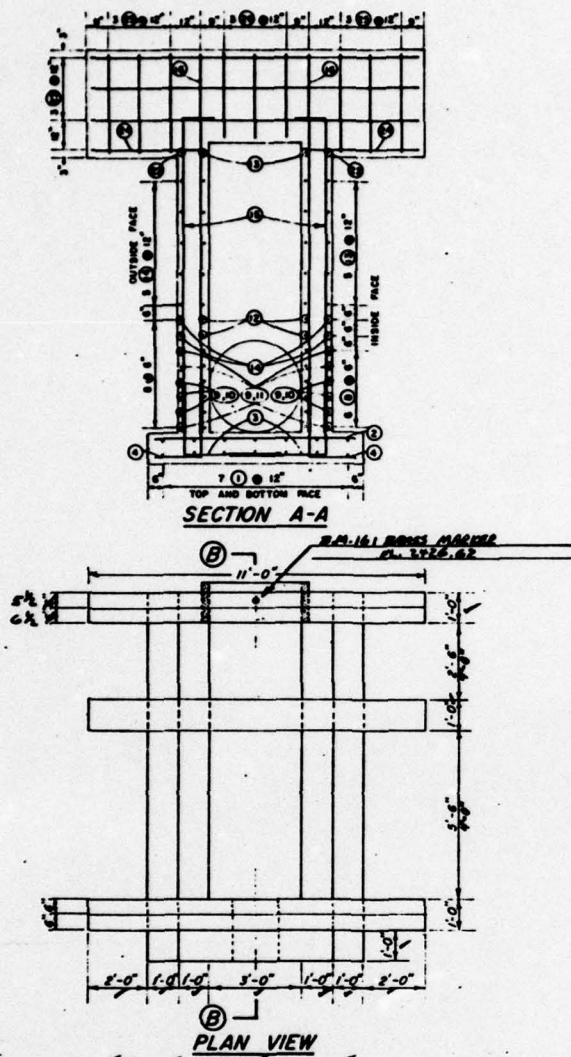
AS BUILT

PLAN-PROFILE OF PRINCIPAL SPILLWAY
 LITTLE YOUGHIOGHENY WATERSHED
 GARRETT COUNTY, MARYLAND
 RESERVOIR NO. 5

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

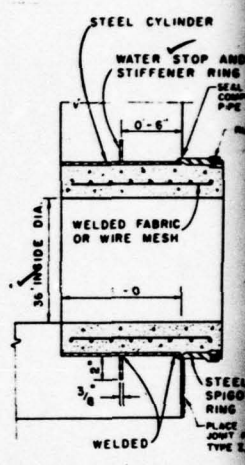
Designed by J. V. BROWN	Date	Approved by
Drawn by R. M. BOUTER & SONS	AS BUILT	Title
Checked by R. M. BOUTER	Sheet No. 7	Drawing No. MD. 406-P
Checked by	of 12	

FORM SCS-313 (APRIL 1963)



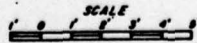
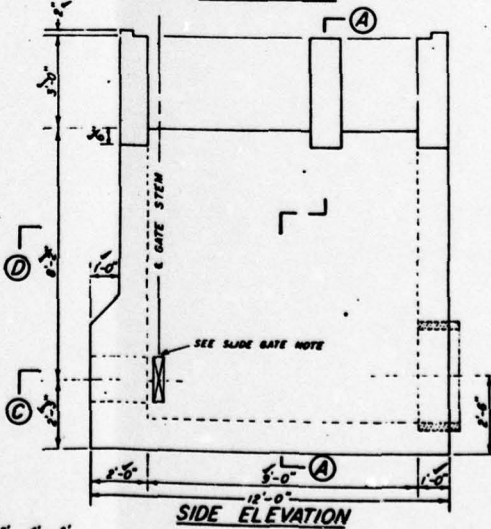
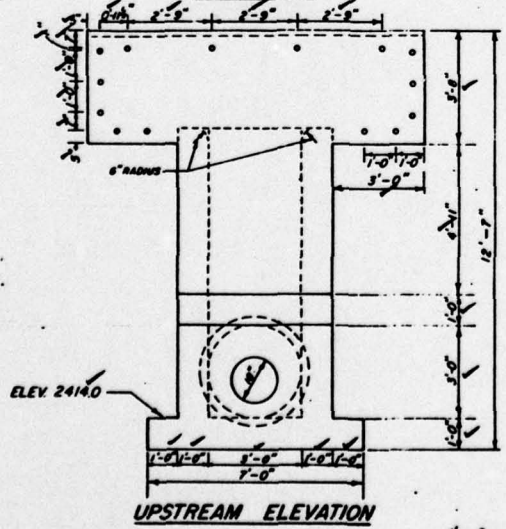
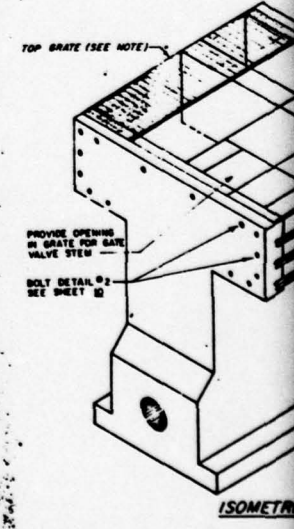
1/4" x 6" STEEL PLATE TO BE CONTINUOUS AND RISER SPLICES ARE TO BE BUTT WELDED, OR LA 3" AND WELDED, OR LA 3" WALL THICKNESS PLACED AT EL. 2410 AND EL. 2422.40

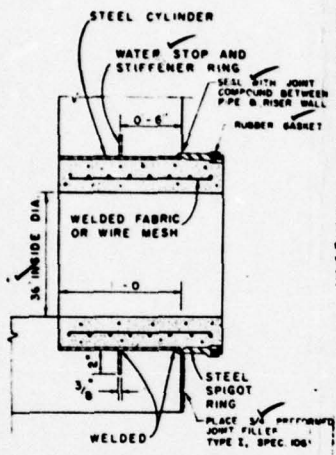
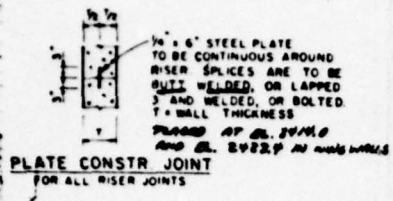
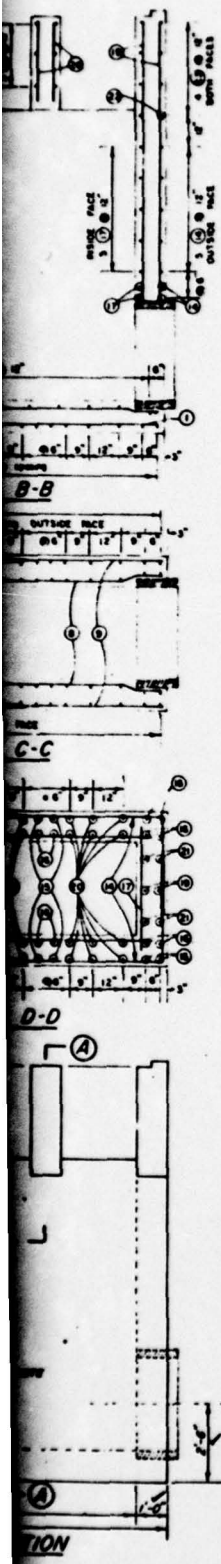
PLATE CONSTR JOINT
FOR ALL RISER JOINTS



SPIGOT RING WALL FITTING

SLIDE GATE NOTES:
1. 1"-12" DIA. SLIDE GATE, CLASS O-20
2. 1/2" TYPE WALL THIMBLE 12" LONG
3. FLAT FRAMED GATE
4. RISING STEM, THREADED PORTION
5. LIFT TYPE B SIZE ACCORDING TO
6. BRONZE LIFT NUT AND SEAT FACED
7. STEM, STEM GUIDES, ANCHOR BOLTS
8. PART IN ACCORDANCE WITH PART
TOP GATE NOTE
9. 1/4" TYPE W/B SIZE 6, 3/4" x 10'-0" PA
BY BORDON METAL PRODUCTS OR APP





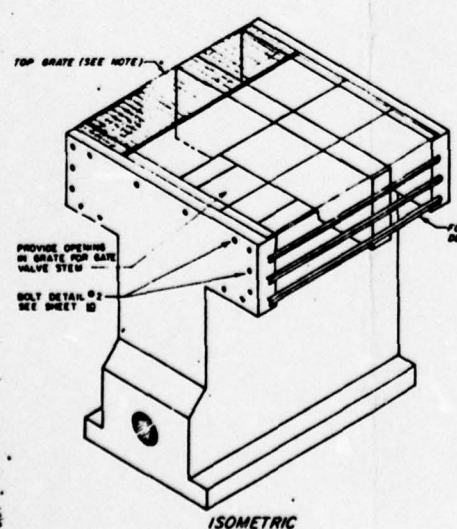
SPIGOT RING WALL FITTING

SLIDE GATE NOTES

1. 1-1/2" DIA SLIDE GATE, CLASS 0-29
2. 2" TYPE WALL THIMBLE 12" LONG
3. FLAT FRAMED GATE
4. RISING STEM, THREADED PORTION BRONZE
5. LIFT TYPE & SIZE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
6. BRONZE LIFT NUT AND SEAT FACING
7. STEM, STEM GUIDES, ANCHOR BOLTS, SIZED AND SPACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
8. PAINT IN ACCORDANCE WITH PAINT SYSTEM "A"

TOP GATE NOTE

1. TYPE W/B - SIZE "8, 32 1/2" x 10'-0" PANELS, AS MADE BY BORDON METAL PRODUCTS OR APPROVED EQUIVALENT



STEEL SCHEDULE

MARK	SIZE	LENGTH	TYPE	B	C	QUANTITY	TOTAL LENGTH
1	3	11'-8"	1			14	164.00'
2	3	6'-8"	1			12	78.00'
3	6	3'-8"	21	3'-3"	2'-3"	30	170.00'
4	6	3'-11"	21	1'-8"	2'-3"	30	117.50'
5	3	6'-10"	21	3'-1"	3'-9"	2	13.67'
6	3	3'-9"	21	2'-0"	3'-9"	2	11.50'
7	3	2'-11"	21	0'-8"	2'-5"	4	11.67'
8	3	11'-8"	1			12	138.00'
9	3	6'-1"	1			12	73.00'
10	3	8'-5"	21	7'-1"	1'-4"	6	50.50'
11	3	10'-2"	21	7'-1"	3'-1"	6	61.00'
12	3	10'-0"	1			4	40.00'
13	3	10'-0"	1			12	120.00'
14	3	9'-2"	21	6'-1"	3'-1"	20	236.67'
15	3	11'-2"	21	10'-2"	1'-0"	12	134.00'
16	3	12'-2"	1			16	194.67'
17	3	4'-0"	1			18	72.00'
18	3	10'-1"	1			2	20.17'
19	3	9'-0"	1			2	18.00'
20	3	9'-1"	1			36	327.00'
21	3	9'-2"	1			4	36.67'
22	3	7'-1"	21	6'-1"	1'-0"	4	29.33'
23	3	12'-6"	1			22	231.00'
24	3	3'-6"	1			4	14.00'
25	3	3'-0"	1			36	108.00'
26	3	2'-6"	1			6	18.00'

STEEL QUANTITIES THIS SHEET ONLY

BAR SIZE	TOTAL LENGTH	TOTAL LBS
#5	2213.9 Lm Fl	2309.1
#6	287.5 Lm Fl	431.8

BAR TYPES



STEEL QUANTITIES, TOTAL JOB

BAR SIZE	TOTAL LENGTH	TOTAL LBS
#4	1600.0 Lm Fl	1089
#5	2699.0 Lm Fl	2815
#6	419.5 Lm Fl	630

REINFORCED CONCRETE QUANTITIES THIS SHEET ONLY 17.1 CU. YDS.

REINFORCED CONCRETE QUANTITIES TOTAL JOB 47.4 CU. YDS.

NON-REINFORCED CONCRETE QUANTITIES TOTAL JOB 57.8 CU. YDS.

CONSTRUCTION DETAILS:

1. CONCRETE SHALL BE CLASS 4000 REINFORCED OR NON-REINFORCED AS INDICATED (SHEETS 8, 9 & 10)
2. PORTLAND CEMENT TYPE 1A OR TYPE L WITH AN AIR-ENTRAPPING ADMIXTURE SHALL BE USED
3. ALL REINFORCING STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MINIMUM OF 3" CLEAR COVER. ALL REINFORCING STEEL PLACED IN CONCRETE POURED IN FORMS SHALL HAVE A MINIMUM OF 2" CLEAR COVER.
4. ALL EXPOSED EDGES OF CONCRETE TO HAVE A 3/4" CHAMFER UNLESS OTHERWISE NOTED.
5. CLASS 2 AGGREGATE SHALL BE SIZE 57, SPEC 101.
6. TOP GATE SHALL BE GALVANIZED IN ACCORDANCE WITH SPEC 118.

AS BUILT

**RISER - REINF. STEEL DETAILS
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 5**

**U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

Designed by J. V. DEBROOK	Approved by
Drawn by E. L. BRIDGES	Checked by
Revised by R. K. KELLY	Sheet No. 8 of 12
Date 12-66	Project No. MD. 406-P

TP 1, SURFACE ELEV. 2631.7

Depth	Depth	
0	1.0	Topsoil
5	9.0	Brown silty clayey sand and lean clay (reworked decomposed shale and siltstone); weathered rock ("Gravel"), 70% less than 3", 2% greater than 3". (SC/CL)

TP 2, SURFACE ELEV. 2613.9

Depth	Depth	
0	1.0	Topsoil
1.0	3.0	Mottled yellow-grey lean clay-(CL).
3.0	7.0	Grey-brown silt, wet clayey sand and gravel. Gravel 15% less than 3", 1% greater than 3". (CC)
7.0	-	Tight green shale - sandstone - unable to dig.

TP 3, SURFACE ELEV. 2612.8

Depth	Depth	
0	1.0	Topsoil
1.0	4.0	Brown-grey moist silty sand-(SP)
4.0	5.5	Grey organic silty sand and gravel, logs and sticks-Alluvium. Backhoe broke down - boring terminated-(CM).

TP 4, SURFACE ELEV. 2646.0

Depth	Depth	
0	0.0	Topsoil
1.5	1.5	Gravel decayed angular sandstone in a yellow sandy clay matrix-moist-(GP)
3.0	3.0	Gravel decayed angular, sandstone and shale fragments in sandy clay matrix-moist-(GC)
4.5	4.5	Clay, sandy micaceous, moist-grey, mottled-(CL)
5.0	5.0	Gravel-decayed sandstone, olive-green, weathered, yellow-(GP)
6.0	6.0	Sandstone, grey-brown. Fine grained, porous massive jointed, Fe stained
11.7	11.7	Sandstone, grey-brown. Very fine grained, micaceous fractured jointed, Fe stained in joints. Driller records mud areas.
14.0	14.0	Sandstone, red, very fine grained, Fe cement
15.0	15.0	Sandstone, grey-brown, micaceous, very fine grained.
15.5	15.5	Sandstone, grey-brown, micaceous, very fine grained.
16.5	16.5	Siltstone, red, micaceous, hardness = 4
17.5	17.5	Sandstone, red, medium grained - micaceous, Fe cement jointed. Trace of CaCO ₃ massive.
20.5	20.5	Sandstone, red, medium grained, micaceous, Fe cement jointed.
23.0	23.0	Sandstone, grey, fine grained, jointed Fe stained in joints, trace of mica, hardness = 4
25.5	25.5	Shale, grey-clayey, trace of mica, few fossils, Trace of CaCO ₃
26.0	26.0	Limestone, grey-hard, fossils
30.5	30.5	Sandstone, grey, medium grained, jointed, CaCO ₃ in joints.
32.0	32.0	Siltstone, grey with a red silt, trace of mica and cement.
37.0	37.0	Sandstone, red-grey, medium grained, jointed, Fe stained in joints
40.5	40.5	Sandstone, grey medium grained. Siltstone cement jointed with CaCO ₃ in joints - fossils
45.0	45.0	Bottom of hole.

*Water loss at 12' stage of 74 g.p.m. Closed to 17.5' and no water loss. *Core catcher ran up the barrel.

TP 5, SURFACE ELEV. 2616.7

Depth	Depth	
0	0.0	Silt dark, mottled roots-(ML)
1.5	1.5	Silt, yellow-brown, mottled, soft-moist-(ML)
3.0	3.0	Sand, silty-brown mottled, 10% angular sandstone-(SM)
4.5	4.5	Sand, clayey, yellow brown, dry to moist, 10% ang. shale and sandstone fragments-(SC)
6.0	6.0	Shale, weathered red clayed-(SC)
7.5	7.5	Shale, weathered red, sandy.
9.0	9.0	Limestone, grey-weathered, yellow pure CaCO ₃ , no joints-fossils
12.0	12.0	Siltstone, red, micaceous, Fe cement.

15.5 Sandstone, red micaceous, Fe cement, Fe jointed-fine grained.
18.0 Bottom of hole.

TP 6, SURFACE ELEV. 2616.6

Depth	Depth	
0	0.0	Topsoil, black, organic.
1.0	1.0	Clay, sandy, light brown, medium consistency, moist-(CL)
1.5	1.5	Sand, clayey, light brown, mottled, loose, moist-(SM)
3.0	3.0	Sand, clayey silt grey-mottled, loose, moist, sand-mottled clayey-(SM)
4.5	4.5	Sand, silty dark grey, mottled, medium consistency, moist-10% angular sandstone-gravels-(M)
6.0	6.0	Sandstone, blue weathered, rotten, micaceous, fine grained
7.5	7.5	Sandstone, blue grey Fe stained, hardness = 3, mica trace
12.1	12.1	Sandstone, grey Fe stain in horizontal planes, Trace of mica porous.
17.1	17.1	Sandstone, brown grey, micaceous, hardness = 3, fine grained.
20.1	20.1	Shale, red, silty, barren as 3
21.1	21.1	Sandstone, red, micaceous
22.1	22.1	Sandstone, red brown-fossils, Fe stained, trace mica porous
23.6	23.6	Limestone, blue-grey, sand-fossils.
25.6	25.6	Shale, sandy, grey, hard.
27.1	27.1	Shale, silty, micaceous, soft, hardness = 3
30.1	30.1	Sandstone-red, Fe cement, micaceous-medium grained. Hardness = 4
32.1	32.1	Shale, clayey, Fe stained in joints. Trace of mica
34.1	34.1	Sandstone, red, micaceous, fine grained, Fe cement
37.1	37.1	Sandstone, red-clayey, micaceous, fine grained, Fe cement. Bottom of hole

TP 7, SURFACE ELEV. 2615.6

Depth	Depth	
0	0.0	Topsoil.
1.0	1.0	Clay, soft, yellow mottled, saturated-(CL)
3.0	3.0	Clay, soft, yellow, mottled, saturated-(CL)
4.5	4.5	Sand clayey, grey mottled, 10% angular sandstone-gravels (SC)
7.0	7.0	Shale, red, soft, hardness = 4, very fine, sandy
8.0	8.0	Sandstone, red, Fe cement, fine-grained, micaceous.
10.0	10.0	Shale, grey, very fine, sandy, hardness = 4
12.0	12.0	Sandstone, grey, fine grained, hardness = 3 Fossils, CaCO ₃ cement
14.0	14.0	Limestone grey - fossils, sandy hard.
16.0	16.0	Limestone - chert - Fe CaCO ₃ fossils have been leached out leaving the clayey iron-rich - well defined waterway open fossil cast.
18.0	18.0	Limestone-chert CaCO ₃ , leached out, defined waterways.
20.0	20.0	Limestone grey, Fe stained fossils.
22.0	22.0	Shale blue-grey clayey, hardness = 3, trace of mica-Fe cement
24.0	24.0	Siltstone red, very fine sand, Fe cement, trace of mica
26.0	26.0	Bottom of hole.

TP 8, SURFACE ELEV. 2615.6

Depth	Depth	
0	0.0	Silt, sandy, yellow-brown, soft moist, 10% shale gravels-(ML)
1.5	1.5	Clay, sandy - tan - mottled, dry, 10% gravels (CL)

Depth	Depth	
3.0	3.0	Sand clayey, tan, mottled, dry, 10% gravels
4.5	4.5	Shale - decayed matrix, sandy, yellow-brown dry (SC)
6.0	6.0	Shale, clayey weathered, hardness = 3
7.2	7.2	Shale, clayey, Fe stained, micaceous, trace of mica
12.2	12.2	Shale, clayey, greyed, Fe stained, micaceous trace becomes coarser grained, jointed.
17.2	17.2	Sandstone, red micaceous, fine grained, Fe cement, hardness = 3
22.2	22.2	Sandstone, greyed micaceous, very fine grained. Fe cement stained Fe stains in joints - some coarser grained towards bottom.
27.2	27.2	Sandstone, greyed micaceous, medium grained, Fe cement
29.2	29.2	Sandstone, grey, micaceous fossils, CaCO ₃ cement, medium grained
30.2	30.2	Limestone grey fossils, dense, sandy.
32.2	32.2	Shale silty red, micaceous, hardness = 3, break along bedding planes.
37.2	37.2	Shale red clayey, jointed, trace of mica - Fe in joints becoming more coarse grained.
39.0	39.0	Siltstone red micaceous trace of Fe in joints sandy Fe cement
41.5	41.5	Sandstone, very red, fossils, trace of mica - Fe and CaCO ₃ cement.
42.2	42.2	Sandstone, grey-medium grained, CaCO ₃ cement - joints filled with CaCO ₃ fossils.
46.2	46.2	Sandstone, greyed fine grained, streaks of CaCO ₃ fossils, Fe cement.
47.2	47.2	Bottom of hole.

TP 206, SURFACE ELEV. 2662.1

Depth	Depth	
0	0.0	Topsoil, roots, cobbles
1.0	1.0	Reddish-brown sandy clay cobbles
3.0	3.0	Reddish-brown silt, some sandstone
6.5	6.5	Light brown silt, some sandstone or shale
18.0	18.0	Bottom of hole

TP 101, SURFACE ELEV. 2616.7

Depth	Depth	
0	0.0	Topsoil.
4.5	4.5	Brown silty lean clay and clayey sand, wind-sandstone blocks ave. 2 x 3, 2' less than 10L. (CM/ML)
11.0	11.0	Mottled brown-grey stiff silt - occasional gravel-(M) Water level 5' (9-00)
11.0	-	Bottom of hole.

TP 102, SURFACE ELEV. 2616.6

Depth	Depth	
0	0.0	Topsoil
1.0	1.0	Tan dry silt, occasionally small boulders, (ML)
4.0	4.0	Brown clayey sand-(SC)
6.0	6.0	Olive clayey shale and siltstone, weathered to small. Gravel 20% less than 3", 1% greater than 3". Water level 5' (9-00)

TP 201, SURFACE ELEV. 2616.7

Depth	Depth	
0	0.0	Topsoil
1.5	1.5	Brown clay sand-(SC)
2.5	2.5	Decomposed large siltstone and shale, shale and siltstone-Gravel 40% less than 3", 10% greater than 3". (CM)
10.5	10.5	Bottom of hole.

TP 202, SURFACE ELEV. 2613.8

Depth	Depth	
0	0.0	Topsoil, roots, trace of cobbles.
1.5	1.5	Brown sandy clay, trace of gravel.
2.5	2.5	Light brown fine sandy silt, trace sandstone.
18.0	18.0	Bottom of hole.

TP 203, SURFACE ELEV. 2613.3

Depth	Depth	
0	0.0	Black loam topsoil.
1.0	1.0	Brown sandy clay.
5.0	5.0	Brown silty clay, trace of gravel or cobble.
7.0	7.0	Light brown silty shale cobbles.
18.0	18.0	Bottom of hole.

P. 400. SURFACE ELEV. 2411.0		P. 401. SURFACE ELEV. 2411.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, cobbles	0.0	Black loam topsoil
1.0	Reddish-brown sandy clay cobbles	0.0	Dark brown fine sandy clay, some gravel
3.0	Reddish-brown silt, some sandstone	9.0	Reddish-brown fine sandy silty clay sandstone
6.5	Light brown silt, some sandstone or shale	16.8	Bottom of hole
10.0	Bottom of hole		

P. 402. SURFACE ELEV. 2412.0		P. 403. SURFACE ELEV. 2412.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 404. SURFACE ELEV. 2413.0		P. 405. SURFACE ELEV. 2413.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 406. SURFACE ELEV. 2414.0		P. 407. SURFACE ELEV. 2414.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 408. SURFACE ELEV. 2415.0		P. 409. SURFACE ELEV. 2415.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 410. SURFACE ELEV. 2416.0		P. 411. SURFACE ELEV. 2416.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 412. SURFACE ELEV. 2417.0		P. 413. SURFACE ELEV. 2417.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 414. SURFACE ELEV. 2418.0		P. 415. SURFACE ELEV. 2418.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

P. 416. SURFACE ELEV. 2419.0		P. 417. SURFACE ELEV. 2419.0	
Depth	Remarks	Depth	Remarks
0.0	Topsoil, roots, trace of cobbles	0.0	Topsoil
1.0	From sandy clay, trace of gravel	1.0	Topsoil
2.0	Light brown fine sandy silt, trace sandstone	1.0	Topsoil
10.0	Bottom of hole	1.0	Topsoil

LOGS OF TEST HOLES
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 5

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location of test holes are shown on sheets 3, 3A, 4, 6 & 7
 Plans, Profiles, Sections

MD 406-2

TP 411, SURFACE ELEV. 2422.1

Depth	Depth
0	0
1	2
2	9
3	11
4	11
5	12
6	20
7	17
8	15
9	20
10	27
11	100

Water level 4' (3/4)

TP 411, SURFACE ELEV. 2411.4

Depth	Depth
0	0.3
0.3	2.2
2.3	9.8
9.8	7.6
7.6	10.4
10.4	-

TP 412, SURFACE ELEV. 2416.0

Depth	Depth
0.0	0.4
0.4	3.0
3.0	3.7
3.7	6.2
6.2	1.0

TP 403, SURFACE ELEV. 2415.0

Depth	Depth
0.0	2.0
2.0	3.7
3.7	4.7
4.7	5.8
5.8	6.4
6.4	-

TP 404, SURFACE ELEV. 2416.3

Depth	Depth
0.0	0.7
0.7	3.6
3.6	5.3
5.3	6.4
6.4	7.0
7.0	-

TP 405, SURFACE ELEV. 2416.8

Depth	Depth
0.0	1.0
1.0	2.8
2.8	5.0
5.0	6.4
6.4	-

TP 406, SURFACE ELEV. 2415.8

Depth	Depth
0.0	1.0
1.0	3.1
3.1	5.8
5.8	6.2
6.2	-

TP 407, SURFACE ELEV. 2417.0

Depth	Depth
0.0	0.6
0.6	3.2
3.2	4.5
4.5	6.7
6.7	7.2
7.2	-

TP 408, SURFACE ELEV. 2416.0

Depth	Depth
0.0	1.0
1.0	4.0
4.0	5.3
5.3	6.2
6.2	-

TP 409, SURFACE ELEV. 2416.3

Depth	Depth
0.0	1.0
1.0	3.5
3.5	5.5
5.5	6.0
6.0	6.8
6.8	-

TP 410, SURFACE ELEV. 2417.0

Depth	Depth
0.0	0.3
0.3	4.0
4.0	4.3
4.3	-

TP 411, SURFACE ELEV. 2422.0

Depth	Depth
0.0	0.4
0.4	4.6
4.6	9.1

TP 412, SURFACE ELEV. 2422.8

Depth	Depth
0.0	0.4
0.4	6.0
6.0	7.5
7.5	8.8
8.8	9.8

TP 413, SURFACE ELEV. 2422.1

Depth	Depth
0.0	3.0
3.0	5.1
5.1	7.0
7.0	-

TP 414, SURFACE ELEV. 2422.2

Depth	Depth
0.0	0.5
0.5	3.5
3.5	5.5
5.5	-

TP 415, SURFACE ELEV. 2425.0

Depth	Depth
0.0	0.8
0.8	3.0
3.0	4.2
4.2	7.0
7.0	-

TP 416, SURFACE ELEV. 2416.8

Depth	Depth
0.0	0.9
0.9	3.3
3.3	4.6
4.6	6.2
6.2	7.0
7.0	8.0
8.0	-

TP 417, SURFACE ELEV. 2417.0

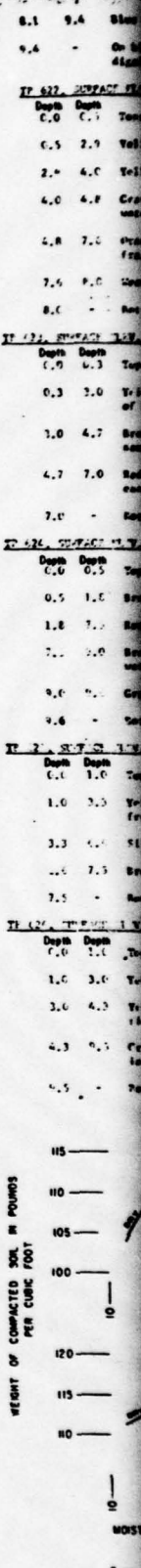
Depth	Depth
0.0	1.0
1.0	3.3
3.3	5.0
5.0	6.2
6.2	7.1

TP 418, SURFACE ELEV. 2422.0

Depth	Depth
0.0	0.4
0.4	1.0
1.0	4.8
4.8	5.3
5.3	-

TP 419, SURFACE ELEV. 2422.0

Depth	Depth
0.0	0.4
0.4	2.2
2.2	7.2
7.2	8.1



TP 222 - GARRETT CO. T.V. 2418.7

Topsoil

Gray, highly plastic clay - very sticky, water saturated-(CH). Water seeping into T.P. (11/64)

Brownish-yellow low plasticity clay-much gravel bedded in clay-water bearing-(GC)

Brown weathered shale and sandstone - many sandstone fragments

Bottom of T.P. - on weathered brown sandstone

TP 242 - GARRETT CO. T.V. 2419.7

Topsoil

Brownish-yellow clay with many rock or gravel fragments. Very wet, saturated-(CH)

Weathered sandstone, bedded in clay, brownish yellow-(GC)

Bottom of T.P. on hard yellow sandstone

TP 243 - GARRETT CO. T.V. 2420.0

Topsoil

Gray-blue low plasticity clay, very moist some gravel-(CL). Water seeping into hole at 3.0'(11/64)

Water bearing clayey gravel-very wet, from water running out of this layer-some rock fragments, max. size 6"x2"x2"-(GC)

Broken and weathered sandstone-brownish yellow

Rock layering easily seen at bottom of hole; all weathered sandstone with clay sand-water flowing into hole thru rock joints to 1.6' below surface

TP 244 - GARRETT CO. T.V. 2416.8

Topsoil and blue grass

Bluish-yellow highly plastic clay, no gravel or rock fragments. Water seeping into hole thru clay-(CH)(11/64)

Reddish-purple silty sand-moist-(CP)

Purple silty gravel-some small clay lumps. Gravel well rounded. Rusty extending down to 5.0'-(GC)

Yellow-brown gravelly clay - moist but not water-low plasticity-(CL/GC)

Bluish weathered sandstone bedded in decomposed shale

Bottom of hole on tight sandstone

TP 245 - GARRETT CO. T.V. 2417.0

Topsoil

Bluish-yellow highly plastic clay-saturated, water seeping into hole at 1.2'-(CH)(11/64)

Well rounded gray gravel, some silty, water bearing-(GC)(CP)

Yellow-brown gravelly clay, low plasticity, easily dry-(CL). It is blue near top-(CL/GC)

Bluish weathered shale-dry, no water seeping in thru above sandstone. Rockbedding clearly seen at bottom

TP 246 - GARRETT CO. T.V. 2417.0

Topsoil

Brownish-yellow clay, low plasticity, water-(CL)

Sandstone rock fragments bedded in clay, clay about 6" at 1.7', hard clayey with (11/64)

Weathered sandstone-sandstone

Bottom of hole on tight weathered sandstone

TP 247 - GARRETT CO. T.V. 2417.0

Topsoil

Yellow-brown silty clay-some rock fragments-(CL/PL)

Brown silty sand, moist, some sandstone fragments-(CL)

Yellow silty sand, some gravel-(CL)

8.1 9.4 Blue clay highly plastic-(CH)

9.4 - On blue silty sand-water bearing, one of dipping (CH)

TP 222 - GARRETT CO. T.V. 2418.7

Depth Depth

0.0 0.1 Topsoil

0.5 2.3 Yellow-brown sandy clay-(SC)

2.3 4.0 Yellow low plasticity clay-(CL)

4.0 4.8 Green coarse silty sand-water bearing, and water seeping-(CH) (11/64)

4.8 7.0 Green-yellow clayey gravel, some sandstone fragments-(GC)

7.0 8.0 Weathered bluish-gray sandstone

8.0 - Bottom of hole

TP 242 - GARRETT CO. T.V. 2419.7

Depth Depth

0.0 0.1 Topsoil

0.3 3.0 Yellow-brown silty sand, some rock fragments of sandstone-(CH)

3.0 4.7 Broken weathered sandstone, bedded in silty sand, some clay-(CH)

4.7 7.0 Reddish-brown weathered shale and sandstone easily rippled

7.0 - Bottom on tight sandstone and shale

TP 243 - GARRETT CO. T.V. 2420.0

Depth Depth

0.0 0.5 Topsoil

0.5 1.0 Brown silty sand-(SC)

1.0 3.0 Brown sandy clay-some rock fragments-(SC)

3.0 5.0 Brown water bearing gravel, some clay lumps water at 3.2'(11/64)

5.0 7.0 Gravel bedded in clay-(GC)

7.0 - Bottom

TP 244 - GARRETT CO. T.V. 2416.8

Depth Depth

0.0 1.0 Topsoil

1.0 3.0 Yellow-blue moist highly plastic clay, free water flowing from clay-(CH)

3.0 4.0 Silty brown gravel-water bearing-(CH)

4.0 7.0 Broken weathered brown sandstone

7.0 - Bottom of hole on weathered sandstone

TP 245 - GARRETT CO. T.V. 2417.0

Depth Depth

0.0 1.0 Topsoil

1.0 3.0 Yellow-blue iron clay-moist-(CL)

3.0 4.3 Yellow sandy clay-low plasticity, clay (11/64)

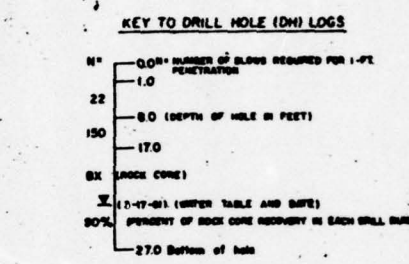
4.3 6.3 Gray sandy clay-some sandstone fragments larger than 3"-(SC)

6.3 - Bottom of hole-barkhoe still digging sandstone

UNIFORM SOIL CLASSIFICATION SYSTEM

GM	Well graded granular gravel-sand mixtures
GP	Poorly graded granular
GM	Silty granular; gravel-sand-silt mixtures
GC	Clayey granular; gravel-sand-clay mixtures
GM	Well graded sand; sand-gravel mixtures
GP	Poorly graded sands
GM	Silty sand
GC	Clayey sand; sand-clay mixtures
ML	Silt with liquid limit of 50 or less
MH	Silt with liquid limit above 50
CL	Clays with liquid limit of 50 or less
CH	Clays with liquid limit above 50
OL	Organic silts and clays with liquid limit of 50 or less
OH	Organic silts and clays with liquid limit above 50

Revised February 1958



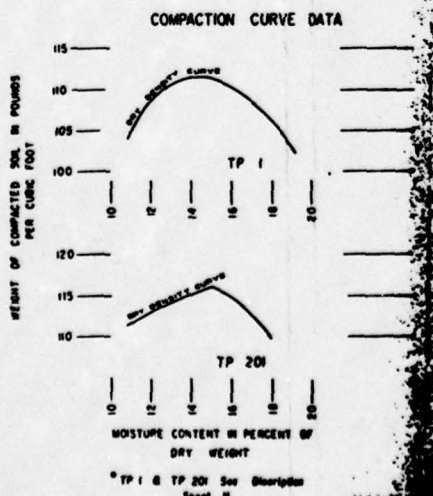
NOTES:

1. All soil and rock descriptions and classifications were determined by visual examination.

2. All blow count data of drill holes (DH series) based on 140 Lb. hammer, 30 inch fall, 2 inch O.D. split spoon sampler.

3. All blow count data of probe (P-400 series) based on 350 Lb. hammer, 30 inch fall 1.5 inch chipping bit.

Location of test holes are shown on sheets 3, 24, 4, 8 & 11 (Plan, Profile, Section)



AS BUILT

LOGS OF TEST HOLES
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 5

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date: _____

Designed by: _____

Drawn by: E. C. COWLEY

Checked by: _____

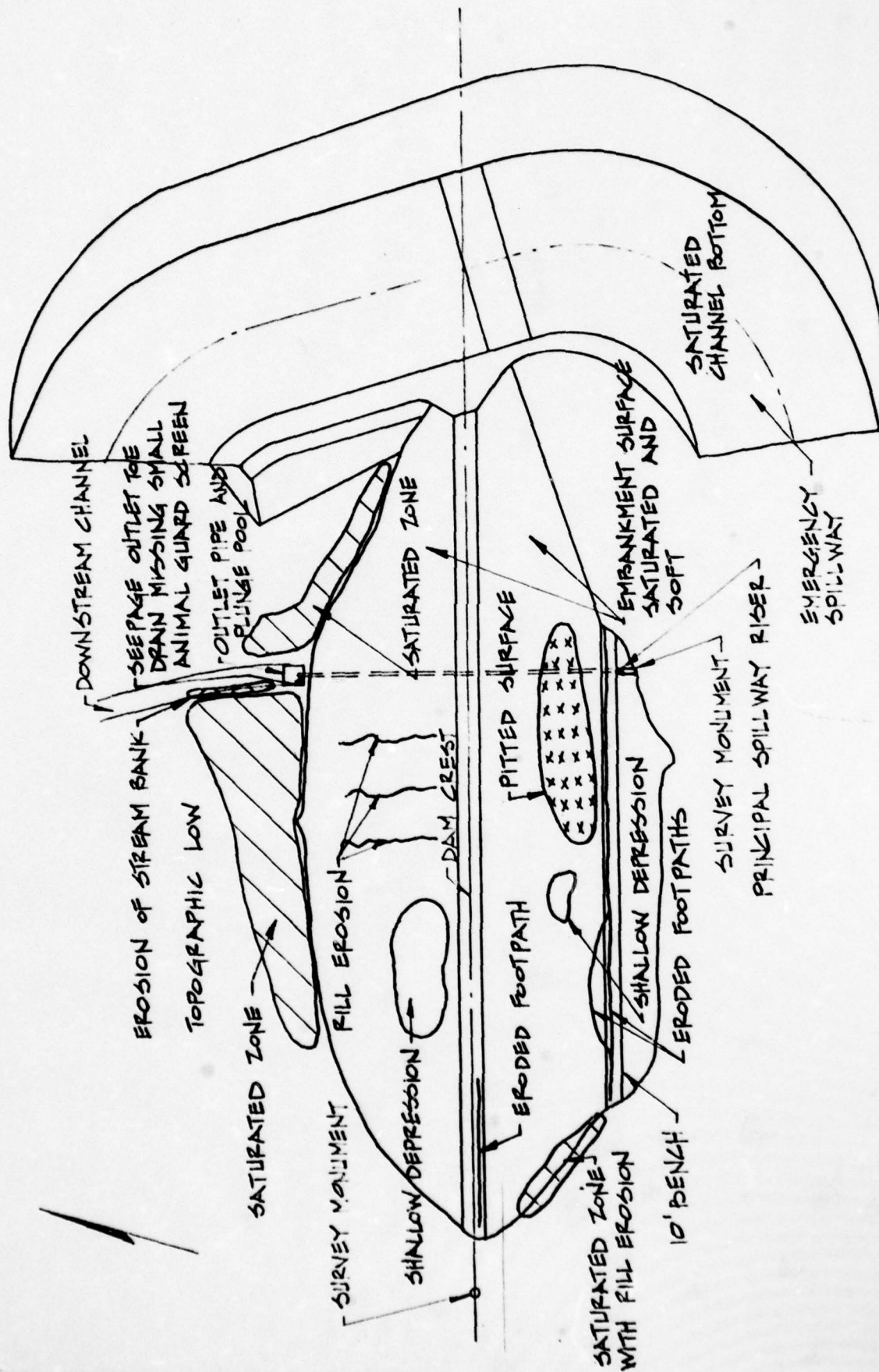
Approved by: _____

Site: _____

Scale: _____

Sheet: _____

APPENDIX A
FIELD SKETCH AND VISUAL OBSERVATIONS CHECKLIST



DOWNSTREAM CHANNEL

VISUAL OBSERVATIONS CHECKLIST

Name Dam Little Youghiogheny County Garrett State Maryland National ID # MD 55
 Type of Dam Earthfill Hazard Category Class I, High hazard
 Date(s) Inspection 4/10/79 Weather Clear, cold Temperature 40°F
 Inspection Review Date 5/24/79 (Ackenheil & Associates personnel only.)

Pool Elevation at Time of Inspection 2,423* Tailwater at Time of Inspection Normal M.S.L.
 *Pool at riser weir crest elevation.

Inspection Personnel:

Ackenheil & Associates

Timothy Debes
 James Hainley
 Michael McCarthy

Water Resources Admin.

Jeffrey Smith
 Thomas Moynahan

Soil Conservation Service

Bill DeBarry
 Walt Payte

Recorder Timothy Debes

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS*</u>
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor rill erosion is evident on downstream slopes and on the upstream west abutment. Past and current grazing activities by cattle have "pitted" slope surfaces. An eroded footpath is located near the upstream shoreline, and extends the entire length of the dam.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No vertical or horizontal misalignment noted.	
RIPRAP FAILURES	N/A	

*REFER TO REPORT SECTIONS 3 AND 7

EMBANKMENT

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
SETTLEMENT	Shallow depressions (less than 0.2 ft. deep) were observed on upstream and downstream embankment slopes. Depressions attributed to loosening of surface soils by grazing activities and subsequent erosion by surface runoff.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Rill erosion evident on upstream west abutment junction. Area is saturated and is subject to surface drainage.	
ANY NOTICEABLE SEEPAGE	Embankment slopes observed saturated and soft in consistency. Snowmelt and loosening of surface soils by grazing activities are the suspected cause of this condition. The downstream toe area is very saturated on both sides of outlet pipe structure. These areas are located in a topographic low and are subject to surface and snowmelt drainage. However, seepage is not considered associated with these conditions at the present time.	
STAFF GAGE AND RECORDER	N/A	
DRAINS	Seepage toe drains showed a clear discharge. Small animal guard screen missing on seepage drain pipe located on west side of concrete outlet pipe. A 6 in. dia. C. I. drain pipe exits from the east plunge pool bank. Protective bituminous pipe coatings are deteriorating.	

OUTLET WORKS

(Pond Drain)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	Gate valve was exercised and found operable. intake riser was observed in good condition. spalling of concrete surfaces was evident.	Reinforced concrete No cracking or
OUTLET STRUCTURE	N/A	
OUTLET CHANNEL	Plung pool riprap in good condition. free of debris and flow obstructions.	Pool and exit channel observed
EMERGENCY GATE	None	

UNGATED SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CONCRETE WEIR	N/A	
APPROACH CHANNEL	Approach channel observed free of debris, erosion, and flow obstructions. Channel is cut into natural earth and is vegetated with grass.	
DISCHARGE CHANNEL	Same condition as "Approach Channel". Spillway discharges into natural stream channel, downstream of dam.	
BRIDGE AND PIERS	None.	

GATED SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

INSTRUMENTATION

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
MONUMENTATION/SURVEYS	Soil Conservation Service benchmarks located on principal spillway intake riser (El. 2,426.62) and west dam abutment centerline (Sta. 9+80, El. 2,462.56). Soil Conservation Service benchmark reportedly located on east dam abutment centerline, was not found.	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	N/A	

RESERVOIR

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
SLOPES	Reservoir slopes mild to moderately sloping. Slopes covered primarily by woodland and appear stable. No discernible evidence of landslides or shoreline erosion.	
SEDIMENTATION	Feeder streams reportedly transport some quantities of silt from neighboring cultivated fields. Reservoir and outlet pipe discharge water observed clear.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Channel bottom about 12 ft. wide, cobble lined and stable. No apparent obstructions are located in the immediate downstream channel reach capable of affecting the functioning of the plunge pool or outlet pipe.	
SLOPES	Erosion is occurring on the west channel bank, just below plunge pool. Erosion extends about 100 ft. downstream.	
APPROXIMATE NO. OF HOMES AND POPULATION	Landon's Dam Run flood plain encompasses about seven (7) farm and home establishments enroute to the Little Youghiogheny confluence.	

APPENDIX B

**CHECKLIST ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION PHASE I**

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Little Youghiogheny
Site No. 5
ID # MD 55

ITEM	REMARKS
AS-BUILT DRAWINGS	As-built drawings available from Soil Conservation Service. See plates 1 through 5.
REGIONAL VICINITY MAP	See Appendix E. U.S.G.S. 7.5 minute quadrangle maps showing dam site location.
CONSTRUCTION HISTORY	Designed and constructed under the supervision of Soil Conservation Service. Construction was started June 20, 1966 and completed November 28, 1966. Construction history included in <u>Engineers Report on Construction and Test Results for Little Youghiogheny Site No. 5</u> prepared March 1968.
TYPICAL SECTIONS OF DAM	See plates 1, 2, 3, and 4 for details of earthfill embankment and cutoff trench.
OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	See plates 4 and 5 for details of principal spillway riser and outlet pipe. Available in design report.
RAINFALL/RESERVOIR RECORDS	None available.

ITEM	REMARKS
DESIGN REPORTS	<u>Little Youghiogheny River Watershed, Site No. 5, design report prepared by Soil Conservation Service, April 3, 1963.</u>
GEOLOGY REPORTS	Geology report included in Soil Conservation Service design report. Prepared July 10, 1961, by J. Ferguson.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Hydrology and hydraulic design calculations and static slope stability results are presented in Soil Conservation Service design report.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Test boring and test pit log data are provided by design report and on as-built drawings. Laboratory shear strength, density, and soil classification data are also included.
POST-CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Borrow source locations are shown on as-built drawings. All sources were located within reservoir boundaries.

REMARKS

ITEM

MONITORING SYSTEMS

None.

Construction modifications included removal of west dam abutment seepage blanket drain and deletion of dental grout treatments of rock foundation surfaces.

MODIFICATIONS

None recorded.

HIGH POOL RECORDS

POST CONSTRUCTION ENGINEERING

STUDIES AND REPORTS

None reported.

PRIOR ACCIDENTS OR FAILURE OF DAM

DESCRIPTION
REPORTS

None reported.

Annual maintenance and operation inspection reports available from Soil Conservation Service District Office in Oakland, MD.

MAINTENANCE
OPERATION
RECORDS

ITEM	REMARKS
SPILLWAY PLAN	See plates 1, 2, and 3 for details. Spillway design calculations included in design report.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None available.
SPECIFICATIONS	Construction Specifications <u>Little Youghiogheny Watershed Site No. 5</u> prepared March 1, 1966. Available in design report.
MISCELLANEOUS	<ol style="list-style-type: none"> 1) Waterway obstruction permit dated April 11, 1966. 2) Annual Operation and Maintenance Inspection reports prepared by Soil Conservation Service 1977 and 1978.

LITTLE YOUGHIOGHENY SITE NO. 5

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Woodland 75%, open pasture about 16%,
remainder crop and urban development.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 2,423.4 ft. (42 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 2,452.8 ft. (1,500 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 2,445.2 ft. (865 ac.-ft.)

ELEVATION TOP DAM: 2,452.8 ft.

EMERGENCY SPILLWAY

- a. Elevation 2,442.0
- b. Type Trapezoidal open channel
- c. Width 125 ft.
- d. Length 600 ft.
- e. Location Spillover East abutment
- f. Number and Type of Gates None

OUTLET WORKS

- a. Type Concrete intake riser and 36 in. dia. R.C. outlet pipe
- b. Location 190 ft. from east abutment and spillway
- c. Entrance Inverts Overflow weir crests: El. 2,423.4
- d. Exit Inverts Outlet pipe: El. 2,412±
- e. Emergency Drawdown Facilities Hand operated 18 in. slide gate
housed in bottom of principal spillway riser.

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location None
- c. Records None

MAXIMUM NON-DAMAGING DISCHARGE Unknown

HYDROGRAPH COMPUTATION

Emergency Spillway Hydrograph

JVD 7/9/65

WATERSHED OR PROJECT Little Youghiogheny STATE Maryland
 STRUCTURE SITE OR SUBAREA Site #5
 DR. AREA 3.36 SQ. MI. T. 1.57 HR. RUNOFF CONDITION NO. II
 RUNOFF CURVE NO. 72 STORM DISTRIB. CURVE B HYDROGRAPH FAMILY NO. 2
 STORM DURATION 6 HR. RAINFALL: POINT 10.2 IN. AREAL — IN.
 Q 6.67 IN. COMPUTED T. 1.10 HR. T. 5.02 HR.
 (T. 1.10) COMPUTED 4.56 USED 4.0 REVISED T. 1.26
 $q_u = \frac{484 A}{REV. T_p} = \frac{484 \times 3.36}{1.26} = 1291$ CFS $Qq_r = 8611$ CFS
 (COLUMN) = (T. 1.26) REV. T. 1.26 (COLUMN) = (q. 1.26) Qd.

LINE NO.	T HOURS	q CFS	LINE NO.	T HOURS	q CFS	LINE NO.	T HOURS	q CFS
1	—	—	21	8.01	112	41		
2	.40	17	22	8.47	69	42		
3	.81	77	23	8.87	43	43		
4	1.21	310	24	9.27	34	44		
5	1.61	1111	25	9.68	26	45		
6	2.02	2859	26	10.08	17	46		
7	2.42	4314	27	10.48	9	47		
8	2.82	4736	28	10.89	—	48		
9	3.23	4306	29		—	49		
10	3.63	3634	30	Check		50		
11	4.03	3083	31	$Q = (\Delta t)(\Sigma q)$		51		
12	4.44	2601	32	$(645)(A)$		52		
13	4.84	2359	33	$\Delta t = .4033$		53		
14	5.24	1981	34	$\Sigma q = 36537$		54		
15	5.64	1679	35	$A = 3.36$		55		
16	6.05	1266	36	$Q = (.4033)(36537)$		56		
17	6.45	852	37	$(645) \times 3.36$		57		
18	6.85	525	38	$Q = 6.799$		58		
19	7.26	319	39	$\% Error = \frac{6.799 - 6.67}{6.67} \times 100$		59		
20	7.66	198	40	$\% Error = 1.93$		60		

VEM 8-6-65

Elev 2492.0

#	Loss	8 cfs base flow
---	------	-----------------

JVD 7/12/65

HYDROGRAPH COMPUTATION
Freeboard HydrographWATERSHED OR PROJECT Little Youghiogheny STATE MarylandSTRUCTURE SITE OR SUBAREA Site #5DR. AREA 3.36 SQ. MI. T_r 1.57 HR.RUNOFF CONDITION NO. IIRUNOFF CURVE NO. 72 STORM DISTRIB. CURVE B HYDROGRAPH FAMILY NO. 1STORM DURATION 6 HR. RAINFALL: POINT 26.2 IN. AREAL — IN. Q 22.04 IN. COMPUTED T_c 1.10 HR. T_o 5.6 HR. $(T_o + T_r)$ COMPUTED 5.09 USED 6 REVISED T_o .93

$$q_p = \frac{484 A}{REV. T_o} = \frac{1749}{.93} \text{ CFS.}$$

$$Q_{q_1} = \frac{38548}{.93} \text{ CFS}$$

$$q(\text{COLUMN}) = (t/T_o) REV. T_o$$

$$q(\text{COLUMN}) = (q_p / Q_{q_1}) Q_{q_1}$$

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	—	—	21	8.18	193	41		
2	.41	116	22	8.59	116	42		
3	.82	501	23	9.00	77	43		
4	1.23	1580	24	9.41	39	44		
5	1.64	3238	25	9.82	—	45		
6	2.05	6784	26			46		
7	2.46	14880	27	Check		47		
8	2.86	19158	28	$Q = \frac{(\Delta t)(\Sigma q)}{(6.45)(A)}$		48		
9	3.27	16576	29			49		
10	3.68	12914	30	$\Delta t = .409$		50		
11	4.09	9945	31	$\Sigma q = 118,845$		51		
12	4.50	7787	32	$A = 3.36$		52		
13	4.91	6322	33			53		
14	5.32	5358	34	$Q = \frac{(.409)(118,845)}{(6.45)(3.36)}$		54		
15	5.73	4780	35			55		
16	6.14	3855	36	$Q = 22.43$		56		
17	6.55	2313	37	$\% \text{ Error} = \frac{22.43 - 22.04}{22.04} \times 100$		57		
18	6.96	1272	38			58		
19	7.37	694	39	$\% \text{ Error} = 1.77$		59		
20	7.77	347	40			60		

APPENDIX D
PHOTOGRAPHS

PHOTOGRAPH 1 Overview of upstream embankment slope.

PHOTOGRAPH 2 Overview of downstream embankment slope.

PHOTOGRAPH 3 Overview of reservoir and immediate watershed area.

PHOTOGRAPH 4 View of principal spillway riser.



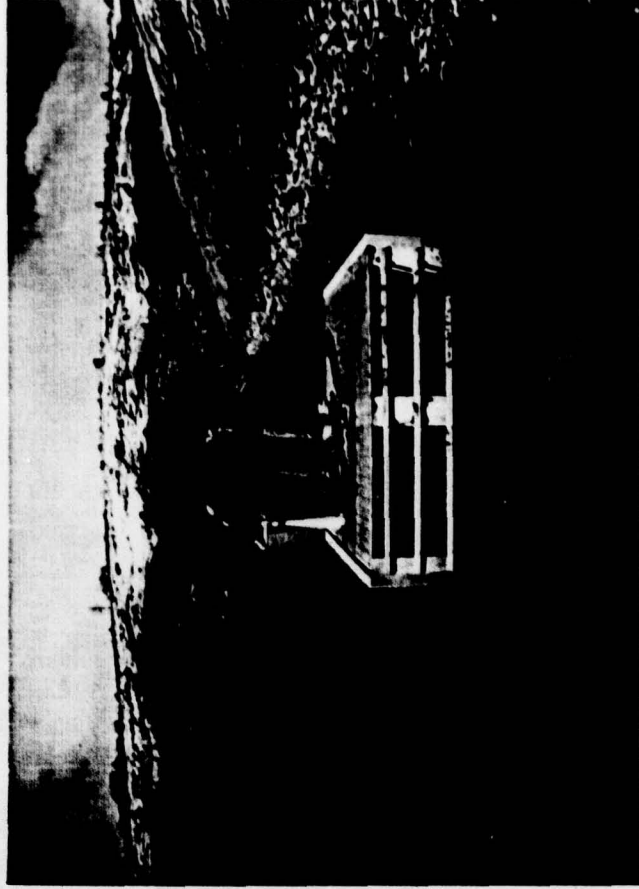
1



2



3



Page D-1

4

PHOTOGRAPH 5

Overview of plunge pool and discharge outlet pipe.

PHOTOGRAPH 6

Close up view of discharge outlet pipe and seepage toe drain.

PHOTOGRAPH 7

Overview of downstream emergency spillway channel.

PHOTOGRAPH 8

Overview of downstream channel. Note residential developments in background.



5



6

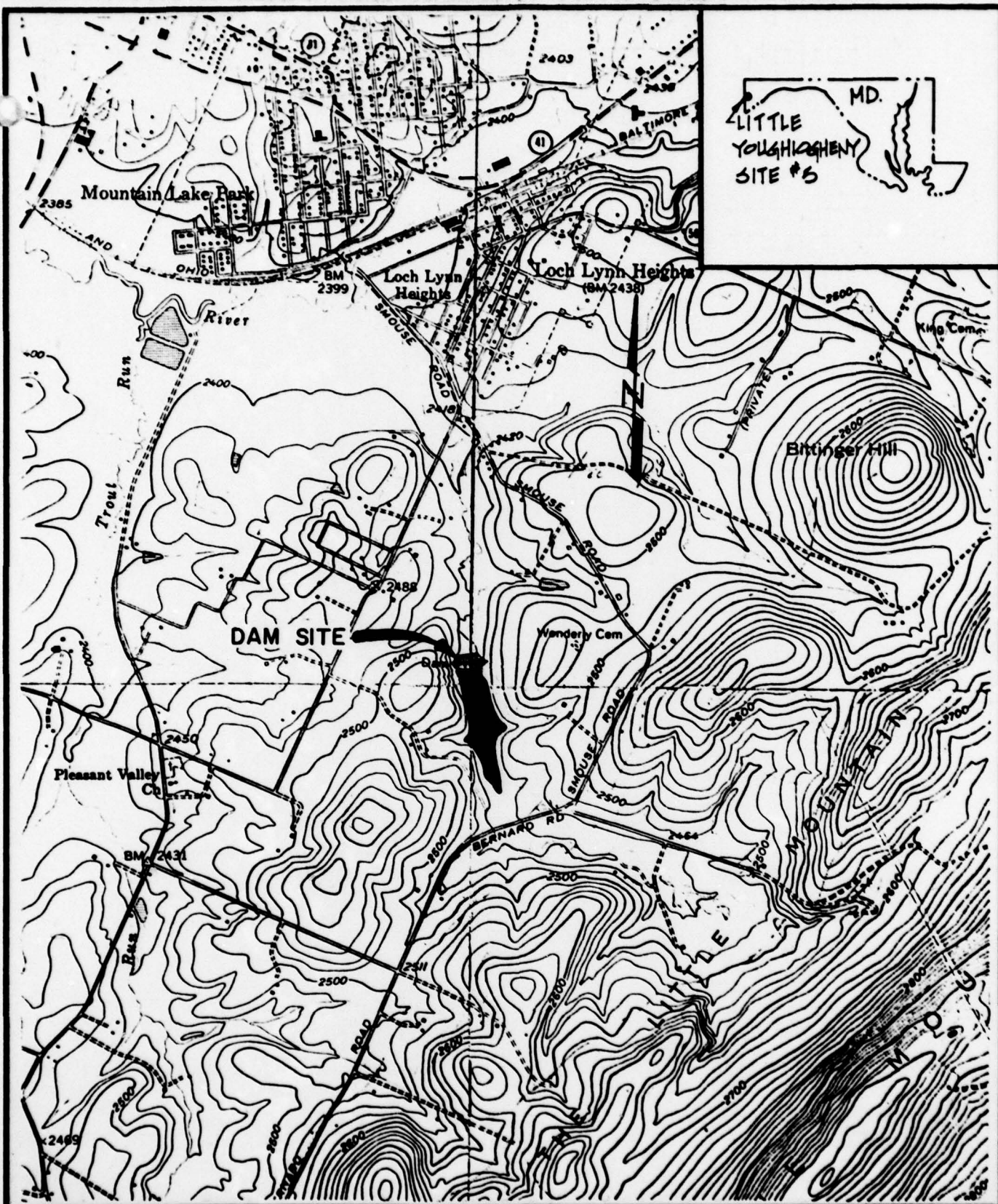


7



8

APPENDIX E
REGIONAL LOCATION PLAN



DATE: MAY 30, 1979
 SCALE: 1:24000
 DR: JLM CK: TED
 DWG. NO. E1

NATIONAL DAM INSPECTION PROGRAM

ACKENHEIL & ASSOCIATES
 CONSULTING ENGINEERS
 BALTIMORE, MD.

LOCATION PLAN
 OF LITTLE
 YOUGHIOGHENY
 SITE #5

APPENDIX F
REGIONAL GEOLOGY

LITTLE YOUGHIOGHENY RIVER DAM SITE NO. 5
NDI I.D. NO. MD 55
REGIONAL GEOLOGY

Little Youghiogheny Site No. 5 is located in the Allegheny Plateau Physiographic Province. The predominate macrostructure of the region is the northeast trending Deer Park Anticline, which extends through eastern Garrett County into Pennsylvania.

The dam is located on the western flank of the Deer Park Anticline, and is underlain by the Upper Devonian Jennings Formation. This formation consists of interbedded marine shale, siltstone, and thin sandstone beds, and is exposed in a belt 3-5 miles wide. This belt forms the central section of the Deer Park Anticline.

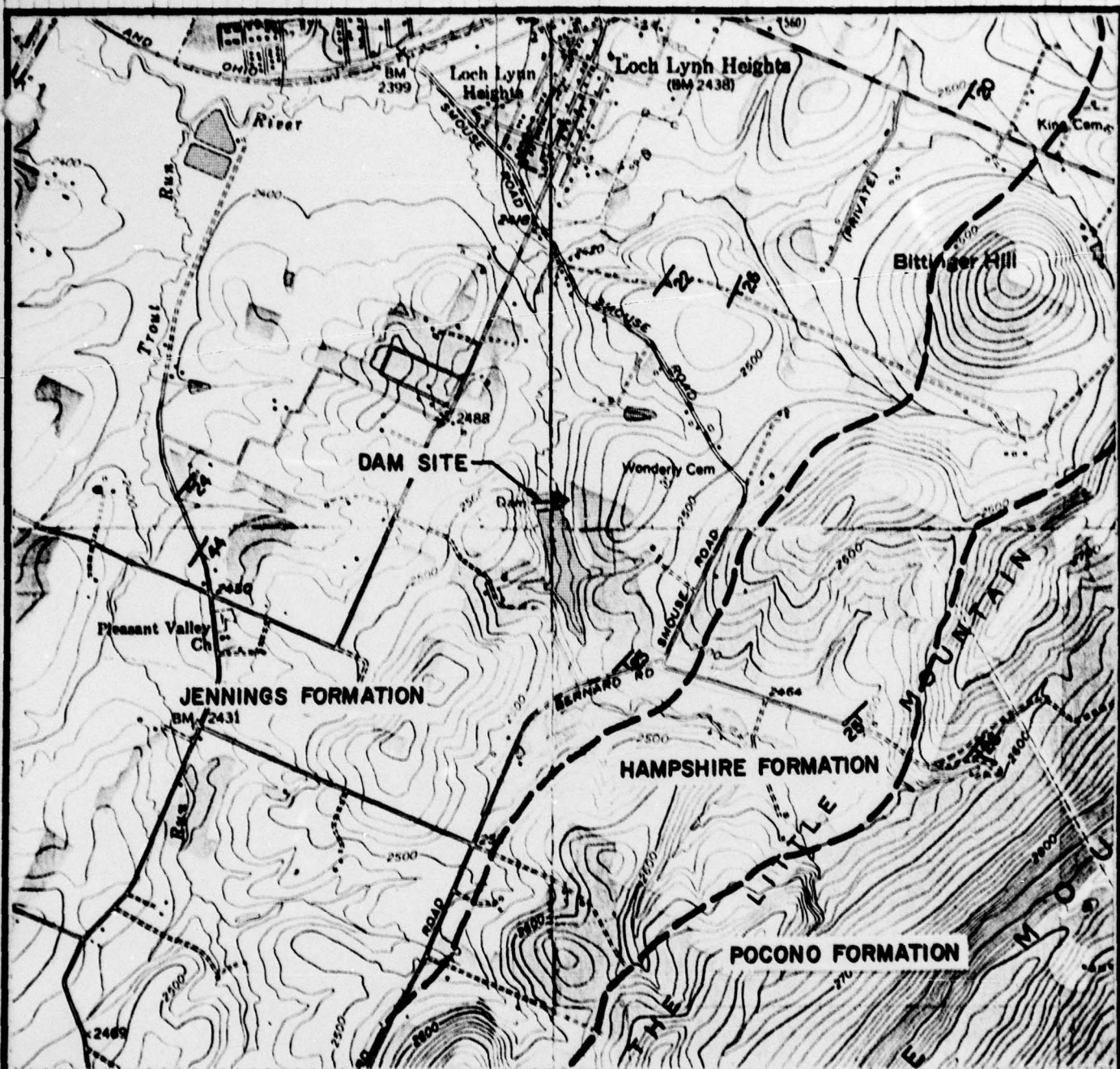
The Hampshire and Pocono Formation contacts are located approximately 0.5 miles and 1 mile from the dam site. Sandstones, alternating with shales, predominately comprised the Hampshire Formation. The Pocono Formation consists of cross-bedded sandstone interbedded with siltstones and shales.

Bedding at the dam site strikes approximately N 40° E, and dips as follows: 22° SE, .75 miles north and southeast of site, and 44° SE, approximately 1 mile southwest of site.

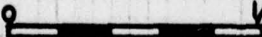
References

Maryland Geological Survey, 1953, reprinted 1965, Geologic Map of Garrett County.

Maryland Geological Survey, revised 1961, reprinted 1966, Bulletin 19, Geography and Geology of Maryland.



OAKLAND, GARRETT COUNTY, MARYLAND

SCALE: 0  1/2 MILE 1:24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

--- FORMATIONAL CONTACT

123 STRIKE AND DIP

DATA OBTAINED FROM MARYLAND GEOLOGICAL SURVEY'S GEOLOGIC MAP OF GARRETT COUNTY, 1963 REPRINTED 1965

DATE: MAY 30, 1979

SCALE: AS SHOWN

DR: JLM CK: TED

DWG. NO. F2

NATIONAL DAM INSPECTION PROGRAM

ACKENHEIL & ASSOCIATES
CONSULTING ENGINEERS
BALTIMORE, MD.

SITE GEOLOGY
OF LITTLE
YOUGHIOGHENY
SITE #5